



Sun Fire X4100 and Sun Fire X4200 Servers Diagnostics Guide

Sun Microsystems, Inc.
www.sun.com

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Preface

The *Sun Fire X4100 and Sun Fire X4200 Servers Diagnostics Guide* contains information and procedures for troubleshooting problems with the servers.

Before You Read This Document

It is important that you review the safety guidelines in the *Sun Fire X4100 and Sun Fire X4200 Servers Safety and Compliance Guide* (819-1161).

Using UNIX Commands

This document might not contain information about basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to the following for this information:

- Software documentation that you received with your system
- Solaris™ Operating System documentation, which is at:

<http://docs.sun.com>

Related Documentation

For a description of the document set for the Sun Fire X4100 and Sun Fire X4200 servers, see the Where To Find Documentation sheet that is packed with your system and also posted at the product's documentation site. See the following URL, then navigate to your product.

<http://www.sun.com/documentation>

Translated versions of some of these documents are available at the web site described above in French, Simplified Chinese, Traditional Chinese, Korean, and Japanese. English documentation is revised more frequently and might be more up-to-date than the translated documentation.

For all Sun hardware documentation, see the following URL:

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For Solaris and other software documentation, see the following URL:

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Typographic ConventionsThird-Party

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this. To delete a file, type <code>rm filename</code> .

* The settings on your browser might differ from these settings.

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819-3284-12

Initial Inspection of the Server

Service Visit Troubleshooting Flowchart

Use the following flowchart as a guideline for using the subjects in this book to troubleshoot the server.

To perform this task:

Refer to these sections:

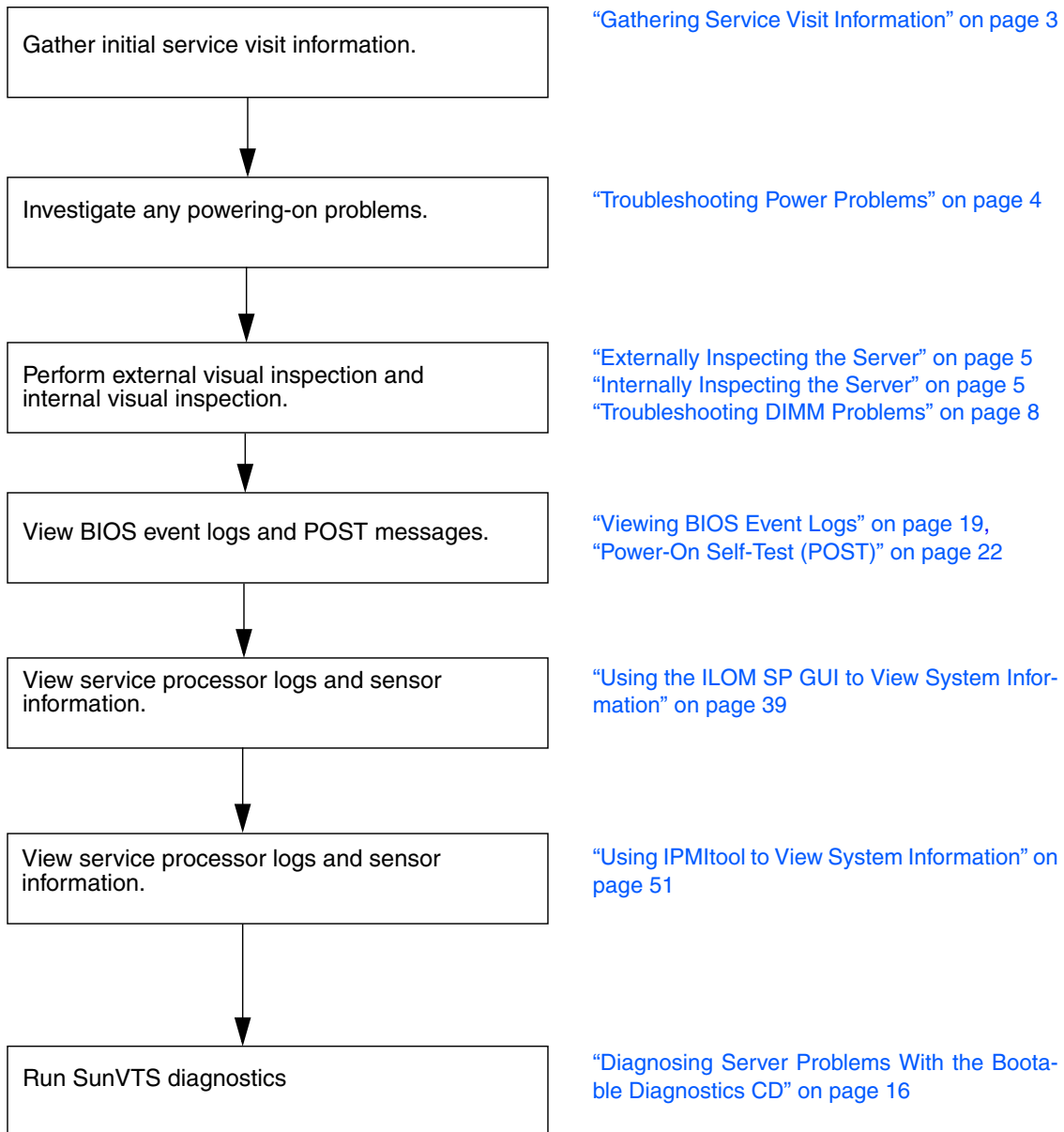


FIGURE 1-1 Troubleshooting Flowchart

Gathering Service Visit Information

The first step in determining the cause of the problem with the server is to gather whatever information you can from the service call paperwork or the on-site personnel. Use the following general guideline steps when you begin troubleshooting.

1. Collect information about the following items:

- Events that occurred prior to the failure
- Whether any hardware or software was modified or installed
- Whether the server was recently installed or moved
- How long the server exhibited symptoms
- The duration or frequency of the problem

2. Document the server settings before you make any changes.

If possible, make one change at a time, in order to isolate potential problems. In this way, you can maintain a controlled environment and reduce the scope of troubleshooting.

3. Take note of the results of any change you make. Include any errors or informational messages.

4. Check for potential device conflicts before you add a new device.

5. Check for version dependencies, especially with third-party software.

Serial Number Locations

The system serial number is located on a sticker that is attached to the front bezel (see [FIGURE 1-2](#) or [FIGURE 1-3](#) for the location).

If the bezel is missing, a second serial number label is affixed to the system:

- For Sun Fire X4100 servers, the second sticker is attached to the top of the chassis, above the power supplies.
- For Sun Fire X4200 servers, the second sticker is attached to the side of the chassis. If you are facing the chassis front, the sticker is on the left side near the front.

System Inspection

Improperly set controls and loose or improperly connected cables are common causes of problems with hardware components.

Troubleshooting Power Problems

- If the server will power on, skip this section and go to [“Externally Inspecting the Server” on page 5](#).
- If the server will not power on, check this list of items:

1. Check that AC power cords are attached firmly to the server’s power supplies and to the AC source.

2. Check that both the main cover and rear cover are firmly in place.

There is an intrusion switch on the front I/O board that automatically shuts down the server power to standby mode when the covers are removed.

3. Investigate the following items, which can trigger an automatic shutdown sequence:

A power-off sequence is initiated either by a request from the board management controller (BMC) or a fault condition.

The conditions that trigger the BMC to issue a shutdown request are:

- An over-temperature condition for more than 1 second.
- Multiple fan failures.

The fault conditions that will trigger a shutdown are:

- All power supplies have failed or have been removed.
- A power supply has been out of spec for more than 100 mS.
- The hot-swap circuit has faulted.
- An over-temperature condition has occurred.

Note – Any power supply that is out of spec causes a reset, but only power supplies that remain out of spec for more than 100 mS cause a shutdown.

Externally Inspecting the Server

To perform a visual inspection of the external system:

1. **Inspect the external status indicator LEDs, which can indicate component malfunction.**
For the LED locations and descriptions of their behavior, see [“External Status Indicator LEDs” on page 33](#).
2. **Verify that nothing in the server environment is blocking air flow or making a contact that could short out power.**
3. **If the problem is not evident, continue with [“Internally Inspecting the Server” on page 5](#).**

Internally Inspecting the Server

Perform a visual inspection of the internal system by following these steps. Stop when you identify the problem.

1. **Choose a method for shutting down the server from main power mode to standby power mode.**
 - **Graceful shutdown:** Use a ballpoint pen or other stylus to press and release the Power button on the front panel. This causes Advanced Configuration and Power Interface (ACPI) enabled operating systems to perform an orderly shutdown of the operating system. Servers not running ACPI-enabled operating systems will shut down to standby power mode immediately.
 - **Emergency shutdown:** Use a ballpoint pen or other stylus to press and hold the Power button for four seconds to force main power off and enter standby power mode.

When main power is off, the Power/OK LED on the front panel will begin flashing, indicating that the server is in standby power mode.



Caution – When you use the Power button to enter standby power mode, power is still directed to the graphics-redirect and service processor (GRASP) board and power supply fans, indicated when the Power/OK LED is flashing. To completely power off the server, you must disconnect the AC power cords from the back panel of the server.

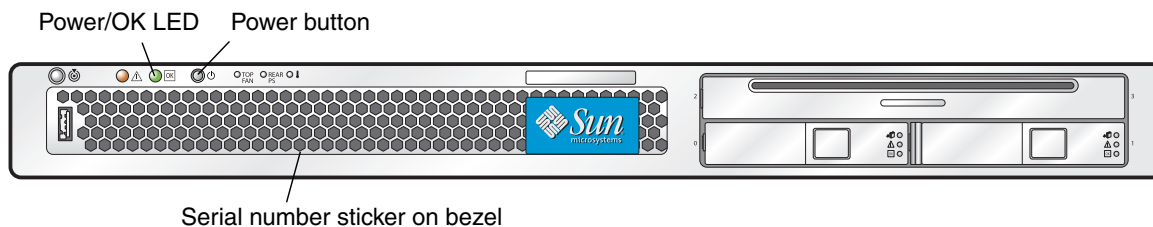


FIGURE 1-2 Sun Fire X4100 Server Front Panel

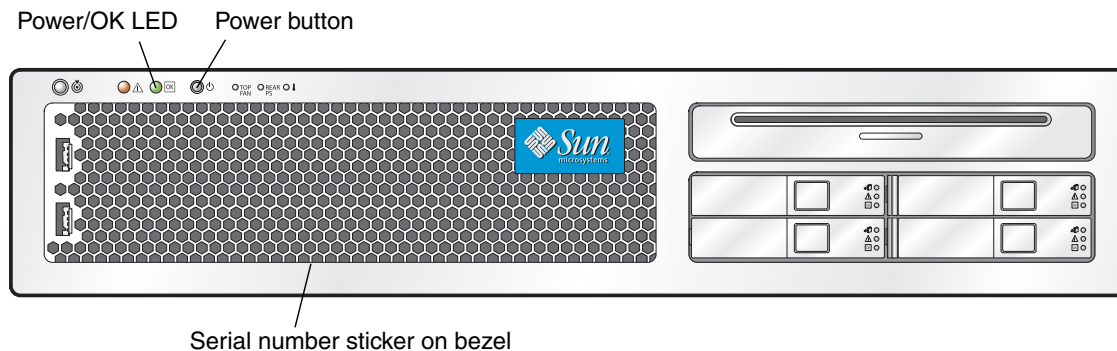


FIGURE 1-3 Sun Fire X4200 Server Front Panel

2. Remove the server covers, as required.

For instructions on removing system covers, refer to the *Sun Fire X4100 and Sun Fire X4200 Servers Service Manual*, 819-1157.

3. Inspect the internal status indicator LEDs, which can indicate component malfunction.

For the LED locations and descriptions of their behavior, see [“Internal Status Indicator LEDs” on page 37](#).

Note – The server must be in standby power mode for viewing the internal LEDs.

Note – You can hold down the Locate button on the server back panel or front panel for 5 seconds to initiate a “push-to-test” mode that illuminates all other LEDs both inside and outside of the chassis for 15 seconds.

4. Verify that there are no loose or improperly seated components.

5. Verify that all cable connectors inside the system are firmly and correctly attached to their appropriate connectors.

6. **Verify that any after-factory components are qualified and supported.**

For a list of supported PCI cards and DIMMs, refer to the *Sun Fire X4100 and Sun Fire X4200 Servers Service Manual*, 819-1157.

7. **Check that the installed DIMMs comply with the supported DIMM population rules and configurations, as described in [“Troubleshooting DIMM Problems” on page 8](#).**

8. **Replace the server covers.**

9. **To restore main power mode to the server (all components powered on), use a ballpoint pen or other stylus to press and release the Power button on the server front panel. See [FIGURE 1-2](#) or [FIGURE 1-3](#).**

When main power is applied to the full server, the Power/OK LED next to the Power button lights and remains lit.

10. **If the problem with the server is not evident, you can try viewing the power-on self test (POST) messages and BIOS event logs during system startup. Continue with [“Viewing BIOS Event Logs” on page 19](#).**

Troubleshooting DIMM Problems

Use this section to troubleshoot problems with memory modules, or DIMMs.

How DIMM Errors Are Handled By the System

Uncorrectable DIMM Errors

For all operating systems (OS), the behavior is the same:

- When UC error happens, the memory controller causes an immediate reboot of the system.
- During reboot, BIOS checks NorthBridge memory controller's "Machine Check" registers and finds out previous reboot was due to Uncorrectable ECC Error (PERR/SERR also), then reports this in POST after the memtest stage: "A Hypertransport Sync Flood occurred on last boot."
- Memory reports this event in Service Processor's System Event Log (SEL) as follows:

```
# ipmitool -H 10.6.77.249 -U root -P changeme -I lanplus sel list
f000 | 02/16/2006 | 03:32:38 | OEM #0x12 |
f100 | OEM record e0 | 00000000040f0c0200200000a2
f200 | OEM record e0 | 01000000040000000000000000
f300 | 02/16/2006 | 03:32:50 | Memory | Uncorrectable ECC | CPU 1 DIMM 0
f400 | 02/16/2006 | 03:32:50 | Memory | Memory Device Disabled | CPU 1
DIMM 0
f500 | 02/16/2006 | 03:32:55 | System Firmware Progress | Motherboard
initialization
f600 | 02/16/2006 | 03:32:55 | System Firmware Progress | Video
initialization
f700 | 02/16/2006 | 03:33:01 | System Firmware Progress | USB resource
configuration
```

Correctable DIMM Errors

At this time, correctable errors are not logged in the server's system event logs. They are reported or handled in the supported operating systems as follows:

Windows server:

- A Machine Check error message bubble pops up on task bar.
- User must manually go into Event Viewer to view errors as follows:
Start-->Administration Tools-->Event Viewer
- View individual errors (by time) to see details of error

Solaris:

- There is no reporting of correctable errors in Solaris x86 at this time.

Linux:

- There is no reporting of correctable errors in the Linux distributions that we support at this time.

BIOS DIMM Error Messages

BIOS will display and log three types of error messages:

NODE-n Memory Configuration Mismatch

The following conditions will cause this error message:

- DIMMs are not paired (Running in 64-bit mode instead of 128-bit mode)
- DIMMs speed not same
- DIMMs do not support ECC
- DIMMs are not registered
- MCT stopped due to errors in DIMM
- DIMMmodule type(buffer) mismatch
- DIMM generation(I/II) mismatch
- DIMM CL/T mismatch
- Banks on two sided DIMM mismatch
- DIMM organization mismatch (128-bit)
- SPD missing Trc or Trfc info

NODE-n Paired DIMMs Mismatch

The following conditions will cause this error message:

- Paired DIMMs are not same, Checksum mismatch

NODE-n DIMMs Manufacturer Mismatch

The following conditions will cause this error message:

- DIMMs Manufacturer not supported
- Only Samsung, Micron, Infineon and SMART DIMMs are supported

This will be displayed when you add Hitachi DIMMs

DIMM Fault LEDs

The ejectors on the DIMM slots on the motherboard contain DIMM fault LEDs. When the system is in standby power mode, these LEDs can indicate a failed DIMM.

Note – The DIMM fault LEDs will always indicate a failed DIMM pair, with the LEDs lit on both slots of the pair that contains the failed DIMM (slots 0+1 or slots 2+3). See [“Isolating and Correcting DIMM ECC Errors” on page 13](#) for a procedure to determine which DIMM of the pair is faulty.

FIGURE 1-4 shows the numbering of the DIMM slots.

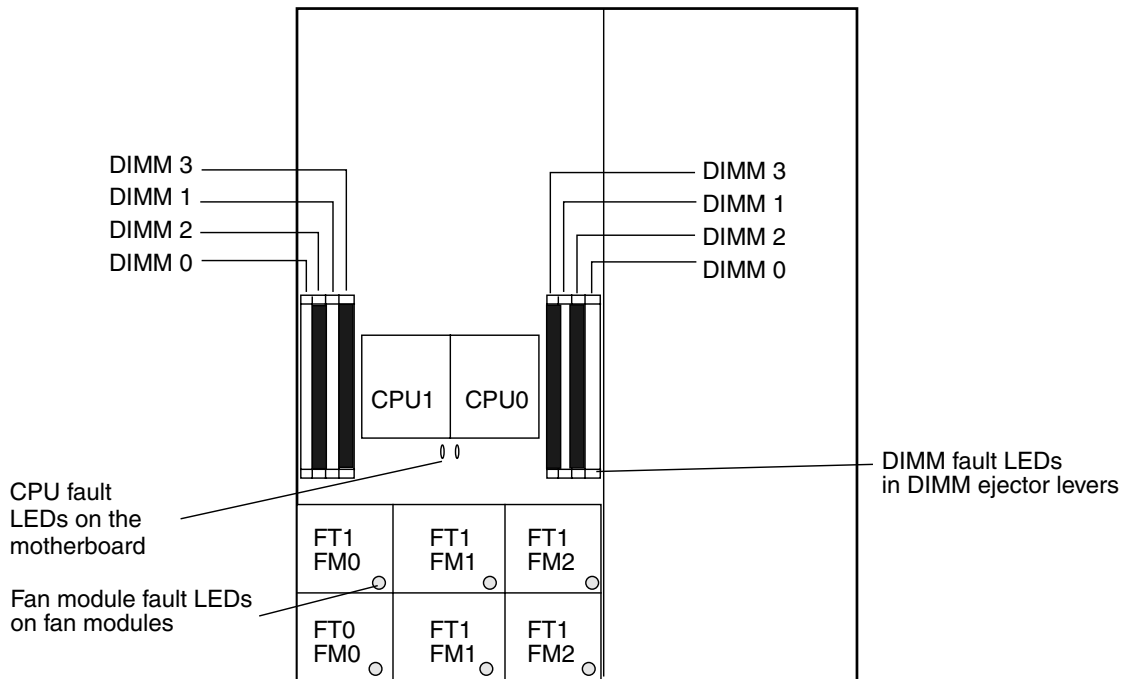


FIGURE 1-4 Sun Fire X4100 and Sun Fire X4200 DIMM Slot Locations

DIMM Population Rules

The DIMM population rules for the Sun Fire X4100 and Sun Fire X4200 servers are listed here:

- Each CPU can support a maximum of four DIMMs.
- The DIMM slots are paired and the DIMMs must be installed in pairs (0 and 1, 2 and 3). The memory sockets are colored black or white to indicate which slots are paired by matching colors.
- CPUs with only a single pair of DIMMs must have those DIMMs installed in that CPU's white DIMM slots (0 and 1).
- Only PC3200 ECC and PC2700 ECC Registered DIMMs are supported.
- Each pair of DIMMs must be identical (same manufacturer, size, and speed).

Supported DIMM Configurations

[TABLE 1-1](#) lists the supported DIMM configurations for the Sun Fire X4100 and Sun Fire X4200 servers.

TABLE 1-1 Supported DIMM Configurations

Slot 3	Slot 1	Slot 2	Slot 0	Total Memory Per CPU
0	512 MB	0	512 MB	1 GB
512 MB	512 MB	512 MB	512 MB	2 GB
512 MB	1 GB	512 MB	1 GB	3 GB
512 MB	2 GB	512 MB	2 GB	5 GB
0	1 GB	0	1 GB	2 GB
1 GB	512 MB	1 GB	512 MB	3 GB
1 GB	1 GB	1 GB	1 GB	4 GB
1 GB	2 GB	1 GB	2 GB	6 GB
0	2 GB	0	2 GB	4 GB
2 GB	512 MB	2 GB	512 MB	5 GB
2 GB	1 GB	2 GB	1 GB	6 GB
2 GB	2 GB	2 GB	2 GB	8 GB

Isolating and Correcting DIMM ECC Errors

If your log files report an ECC error or a problem with a DIMM, complete the steps below until you can isolate the fault.

In this example, the log file reports an error with the DIMM in CPU0, slot 1. The fault LEDs on CPU0, slots 0+1 are lit.

1. If you have not already done so, shut down your server to standby power mode and remove the main cover.

Refer to the *Sun Fire X4100 and Sun Fire X4200 Servers Service Manual*, 819-1157.

2. Inspect the installed DIMMs to ensure that they comply with the “[DIMM Population Rules](#)” on [page 12](#) and the “[Supported DIMM Configurations](#)” on [page 12](#).
3. Inspect the fault LEDs on the DIMM slot ejectors and the CPU LEDs on the motherboard. See [FIGURE 1-4](#).

If any of these LEDs are lit, they can indicate the component with the fault.

4. Disconnect the AC power cords from the server.



Caution – Before handling components, attach an ESD wrist strap to a chassis ground (any unpainted metal surface). The system’s printed circuit boards and hard disk drives contain components that are extremely sensitive to static electricity.

5. Remove the DIMMs.
6. Visually inspect the DIMMs for physical damage, dust, or any other contamination on the connector or circuits.
7. Visually inspect the DIMM slot for physical damage. Look for cracked or broken plastic on the slot.
8. Dust off the DIMMs, clean the contacts, and reseal them.
9. If there is no obvious damage, exchange the individual DIMMs between the two slots of a given pair. Ensure that they are inserted correctly with ejector latches secured.

Using the example, remove the DIMMs from CPU0, slots 0+1 then reinstall the DIMM from slot 1 into slot 0; reinstall the DIMM from slot 0 into slot 1.

10. Reconnect AC power cords to the server.
11. Power on the server and run the diagnostics test again.
12. Review the log file.

- If the error now appears in CPU0, slot 0 (opposite to the original error in slot 1), the problem is related to the individual DIMM. In this case, return both DIMMs (the pair) to the Support Center for replacement.
- If the error still appears in CPU0, slot 1 (as the original error did), the problem is not related to an individual DIMM. Instead, it might be caused by CPU0 or by the DIMM slot. Continue with the next step.

13. Shut down the server again and disconnect the AC power cords.

14. Remove both DIMMs of the pair and install them into paired slots on the opposite CPU.

Using the example, install the two DIMMs from CPU0, slots 0+1 into CPU1, slots 0+1 or CPU1, slots 2+3.

15. Reconnect AC power cords to the server.

16. Power on the server and run the diagnostics test again.

17. Review the log file.

- If the error now appears under the CPU that manages the DIMM slots you just installed, the problem is with the DIMMs. Return both DIMMs (the pair) to the Support Center for replacement.
- If the error remains with the original CPU, there is a problem with that CPU.

Diagnostic Testing Software

This chapter contains information about a diagnostic software tools that you can use.

SunVTS Diagnostic Tests

The Sun Fire X4100 and Sun Fire X4200 servers are shipped with a bootable diagnostics CD that contains SunVTS™ software.

SunVTS is the Sun Validation Test Suite, which provides a comprehensive diagnostic tool that tests and validates Sun hardware by verifying the connectivity and functionality of most hardware controllers and devices on Sun platforms. SunVTS software can be tailored with modifiable test instances and processor affinity features.

Only the following tests are supported on x86 platforms. The current x86 support is for the 32-bit operating system only.

- CD DVD Test (cddvdtest)
- CPU Test (cputest)
- Disk and Floppy Drives Test (disktest)
- Data Translation Look-aside Buffer (dtlbtest)
- Floating Point Unit Test (fputest)
- Network Hardware Test (nettest)
- Ethernet Loopback Test (netlbttest)
- Physical Memory Test (pmemtest)
- Serial Port Test (serialtest)
- System Test (systest)
- Universal Serial Bus Test (usbtest)
- Virtual Memory Test (vmemtest)

SunVTS software has a sophisticated graphical user interface (GUI) that provides test configuration and status monitoring. The user interface can be run on one system to display the SunVTS testing of another system on the network. SunVTS software also provides a TTY-mode interface for situations in which running a GUI is not possible.

SunVTS Documentation

For the most up-to-date information on SunVTS software, go to this site:

http://www.sun.com/products-n-solutions/hardware/docs/Software/system_administration/tools/testing_valid/sunvts/index.html

Diagnosing Server Problems With the Bootable Diagnostics CD

SunVTS 6.0 software is preinstalled on these servers. The server is also shipped with the Sun Fire X4100 and Sun Fire X4200 Servers Bootable Diagnostics CD (705-1439). This CD is designed so that the server will boot from the CD. This CD will boot the Solaris™ Operating System and start SunVTS software. Diagnostic tests will run and write output to log files that the service technician can use to determine the problem with the server.

Requirements

- You must install SunVTS 6.0 Patch Set 3 to get the full diagnostic capability of SunVTS 6.0. Download Patch Set 3 from the Downloads link at either of the following URLs:
<http://www.sun.com/servers/entry/x4100/index.html>
<http://www.sun.com/servers/entry/x4200/index.html>
- To use the Sun Fire X4100 and Sun Fire X4200 Servers Bootable Diagnostics CD, you must have a keyboard, mouse, and monitor attached to the server on which you are performing diagnostics.

Using the Bootable Diagnostics CD

To use the Sun Fire X4100 and Sun Fire X4200 Servers Bootable Diagnostics CD to perform diagnostics:

1. **With the server powered on, insert the Sun Fire X4100 and Sun Fire X4200 Servers Bootable Diagnostics CD into the DVD-ROM drive.**
2. **Reboot the server, but press F2 during the start of reboot so that you can change the BIOS setting for boot-device priority.**
3. **When the BIOS Main menu appears, navigate to the BIOS Boot menu.**

Instructions for navigating within the BIOS screens are printed on the BIOS screens.

4. **On the BIOS Boot menu screen, select Boot Device Priority.**

The Boot Device Priority screen appears.

5. **Select the DVD-ROM drive to be the primary boot device.**

6. **Save and exit the BIOS screens.**

7. **Reboot the server.**

When the server reboots from the CD in the DVD-ROM drive, the Solaris Operating System boots and SunVTS software starts and opens its first GUI window.

8. **In the SunVTS GUI, press Enter or click the Start button when you are prompted to start the tests.**

The test suite will run until it encounters an error or the test is completed.

Note – The CD will take approximately nine minutes to boot.

9. **When SunVTS software completes the test, review the log files generated during the test.**

SunVTS provides access to four different log files:

- SunVTS test error log contains time-stamped SunVTS test error messages. The log file path name is `/var/opt/SUNWvts/logs/sunvts.err`. This file is not created until a SunVTS test failure occurs.
- SunVTS kernel error log contains time-stamped SunVTS kernel and SunVTS probe errors. SunVTS kernel errors are errors that relate to running SunVTS, and not to testing of devices. The log file path name is `/var/opt/SUNWvts/logs/vtsk.err`. This file is not created until SunVTS reports a SunVTS kernel error.

- SunVTS information log contains informative messages that are generated when you start and stop the SunVTS test sessions. The log file path name is `/var/opt/SUNWvts/logs/sunvts.info`. This file is not created until a SunVTS test session runs.
 - Solaris system message log is a log of all the general Solaris events logged by `syslogd`. The path name of this log file is `/var/adm/messages`.
- a. Click the Log button.**
The Log file window is displayed.
- b. Specify the log file that you want to view by selecting it from the Log file window.**
The content of the selected log file is displayed in the window.
- c. With the three lower buttons you can do the following actions:**
- **Print the log file:** A dialog box appears for you to specify your printer options and printer name.
 - **Delete the log file:** The file remains displayed, but will be gone the next time you try to display it.
 - **Close the Log file window:** The window is dismissed.

Note – If you want to save the log files: You must save the log files to another networked system or a removable media device. When you use the Bootable Diagnostics CD, the server boots from the CD. Therefore, the test log files are not on the server's hard disk drive and they will be deleted when you power cycle the server.

BIOS Event Logs and POST Codes

This appendix contains information about BIOS event logs, power-on self test (POST), and console redirection.

Viewing BIOS Event Logs

Use this procedure to view the BIOS event log and the BMC system event log:

1. **To turn on main power mode (all components powered on), use a ball-point pen or other stylus to press and release the Power button on the server front panel. See [FIGURE 1-1](#) or [FIGURE 1-2](#).**

When main power is applied to the full server, the Power/OK LED next to the Power button lights and remains lit.

2. **Enter the BIOS Setup utility by pressing the F2 key while the system is performing the power-on self-test (POST).**

The BIOS Main menu screen is displayed.

3. **View the BIOS event log:**

- a. **From the BIOS Main Menu screen, select Advanced.**

The Advanced Settings screen is displayed:

```

Main      Advanced  PCIpnp  Boot    Security  Chipset  Exit
*****
* Advanced Settings                                     * Options for CPU *
* *****
* WARNING: Setting wrong values in below sections      *
*      may cause system to malfunction.                 *
*
* * CPU Configuration                                  *
* * IDE Configuration                                  *
* * SuperIO Configuration                              *
* * ACPI Configuration                                 *
* * Event Log Configuration                            *
* * Hyper Transport Configuration                      *
* * IPMI 2.0 Configuration                             *
* * MPS Configuration                                  *
* * AMD PowerNow Configuration                         *
* * Remote Access Configuration                       *
* * USB Configuration                                 *
*
* * ** Select Screen *
* * ** Select Item  *
* * Enter Go to Sub Screen *
* * F1 General Help  *
* * F10 Save and Exit *
* * ESC Exit         *
* *****s

```

FIGURE A-1 BIOS Advanced Settings Menu Main Screen

b. From the Advanced Settings screen, select Event Log Configuration.

The Advanced Menu Event Logging screen is displayed.

```

Advanced
*****
* Event Logging details                                * View all unread events *
* ***** on the Event Log. *
* View Event Log                                       *
* Mark all events as read                             *
* Clear Event Log                                     *
*
* * ** Select Screen *
* * ** Select Item  *
* * Enter Go to Sub Screen *
* * F1 General Help  *
* * F10 Save and Exit *
* * ESC Exit         *
* *****s

```

FIGURE A-2 BIOS Advanced Menu Event Logging Screen

c. From the Event Logging Details screen, select View Event Log.

All unread events are displayed.

4. View the BMC system event log:

a. From the BIOS Main Menu screen, select Advanced.

The Advanced Settings screen is displayed.

b. From the Advanced Settings screen, select IPMI 2.0 Configuration.

The Advanced Menu IPMI 2.0 Configuration screen is displayed:

```
Advanced
*****
* IPMI 2.0 Configuration                               * View all events in the *
* *****                                           * BMC Event Log.        *
* Status Of BMC                                     Working          *
* * View BMC System Event Log                       * It will take up to    *
* Reload BMC System Event Log                       * 60 Seconds approx.   *
* Clear BMC System Event Log                         * to read all          *
* * LAN Configuration                               * BMC SEL records.     *
* * PEF Configuration                               *                      *
* BMC Watch Dog Timer Action [Disabled]              *                      *
*                                                    *                      *
*                                                    *                      *
*                                                    *                      *
* ** Select Screen                                  *                      *
* ** Select Item                                    *                      *
* Enter Go to Sub Screen *                          *                      *
* F1 General Help                                     *                      *
* F10 Save and Exit                                  *                      *
* ESC Exit                                           *                      *
*                                                    *                      *
*****S
```

FIGURE A-3 BIOS Advanced, IPMI 2.0 Configuration Screen

c. From the IPMI 2.0 Configuration screen, select View BMC System Event Log.

The log takes about 60 seconds to generate, then it is displayed on the screen.

5. If the problem with the server is not evident, continue with [“Using the ILOM SP GUI to View System Information” on page 39](#), or [“Using IPMITool to View System Information” on page 51](#).

Power-On Self-Test (POST)

The system BIOS provides a rudimentary power-on self-test. The basic devices required for the server to operate are checked, memory is tested, the LSI 1064 disk controller and attached disks are probed and enumerated, and the two Intel dual-gigabit Ethernet controllers are initialized.

The progress of the self-test is indicated by a series of POST codes. These codes are displayed at the bottom right corner of the system's VGA screen (once the self-test has progressed far enough to initialize the system video). However, the codes are displayed as the self-test runs and scroll off of the screen too quickly to be read. An alternate method of displaying the POST codes is to redirect the output of the console to a serial port (see [“Redirecting Console Output” on page 23](#)).

How BIOS POST Memory Testing Works

The BIOS POST memory testing is performed as follows:

1. The first megabyte of DRAM is tested by the BIOS before the BIOS code is shadowed (that is, copied from ROM to DRAM).
2. Once executing out of DRAM, the BIOS performs a simple memory test (a write/read of every location with the pattern 55aa55aa).

Note – This memory test is performed only if Quick Boot is *not* enabled from the Boot Settings Configuration screen. Enabling Quick Boot causes the BIOS to skip the memory test. See [“Changing POST Options” on page 24](#) for more information.

3. The BIOS polls the memory controllers for both correctable and uncorrectable memory errors and logs those errors into the service processor.

Redirecting Console Output

Use these instructions to access the service processor and redirect the console output so that the BIOS POST codes can be read.

1. **Initialize the BIOS Setup utility by pressing the F2 key while the system is performing the power-on self-test (POST).**
The BIOS Main menu screen is displayed.
2. **When the BIOS Main menu screen is displayed, select Advanced.**
3. **When the Advanced Settings screen is displayed, select IPMI 2.0 Configuration.**
4. **When the IPMI 2.0 Configuration screen is displayed, select the LAN Configuration menu item.**
5. **Select the IP Address menu item.**

The service processor's IP address is displayed using the following format:

Current IP address in BMC : xxx.xxx.xxx.xxx

6. **Start a web browser and type the service processor's IP address in the browser's URL field.**
7. **When you are prompted, for a user name and password, type the following:**
 - User Name: **root**
 - Password: **changeme**
8. **When the ILOM Service Processor web GUI screen is displayed, click the Remote Control tab.**
9. **Click the Redirection tab.**
10. **Set the color depth for the redirection console at either 6 or 8 bits.**
11. **Click the Start Redirection button.**
12. **When you are prompted for a user name and password, type the following:**
 - User Name: **root**
 - Password: **changeme**

The current POST screen is displayed.

Changing POST Options

These instructions are optional, but you can use them to change the operations that the server performs during POST testing.

1. **Initialize the BIOS Setup utility by pressing the F2 key while the system is performing the power-on self-test (POST).**

The BIOS Main menu screen is displayed.

- 2. When the BIOS Main menu screen is displayed, select Boot.**

The Boot Settings screen is displayed.

[illegible]

FIGURE A-4 BIOS Boot Settings Screen

- 3. When the Boot Settings screen is displayed, select Boot Settings Configuration.**

The Boot Settings Configuration screen is displayed.

```

                                Boot
*****
* Boot Settings Configuration          * Allows BIOS to skip      *
* *****                          * certain tests while      *
* Quick Boot                        [Disabled] * booting. This will      *
* System Configuration Display      [Disabled] * decrease the time      *
* Quiet Boot                       [Disabled] * needed to boot the     *
* Language                         [English]  * system.                *
* AddOn ROM Display Mode           [Force BIOS] *                      *
* Bootup Num-Lock                  [On]       *                      *
* Wait For 'F1' If Error           [Disabled] *                      *
* Interrupt 19 Capture             [Disabled] *                      *
*                                  *                      *
*                                  * **   Select Screen    *
*                                  * **   Select Item      *
*                                  * +-   Change Option   *
*                                  * F1    General Help    *
*                                  * F10   Save and Exit   *
*                                  * ESC   Exit           *
*                                  *                      *
*****g

```

FIGURE A-5 BIOS Boot Menu Boot Settings Configuration Screen

4. On the Boot Settings Configuration screen, there are several options that you can enable or disable:

- **Quick Boot:** This option is disabled by default. If you enable this, the BIOS skips certain tests while booting, such as the extensive memory test. This decreases the time it takes for the system to boot.
- **System Configuration Display:** This option is disabled by default. If you enable this, the System Configuration screen is displayed before booting begins.
- **Quiet Boot:** This option is disabled by default. If you enable this, the Sun Microsystems logo is displayed instead of POST codes.
- **Language:** This option is reserved for future use. Do not change.
- **Add On ROM Display Mode:** This option is set to Force BIOS by default. This option has effect only if you have also enabled the Quiet Boot option, but it controls whether output from the Option ROM is displayed. The two settings for this option are as follows:
 - **Force BIOS:** Remove the Sun logo and display Option ROM output.
 - **Keep Current:** Do not remove the Sun logo. The Option ROM output is not displayed.
- **Boot Num-Lock:** This option is On by default (keyboard Num-Lock is turned on during boot). If you set this to off, the keyboard Num-Lock is not turned on during boot.
- **Wait for F1 if Error:** This option is disabled by default. If you enable this, the system will pause if an error is found during POST and will only resume when you press the F1 key.
- **Interrupt 19 Capture:** This option is reserved for future use. Do not change.

POST Codes

[TABLE A-1](#) contains descriptions of each of the POST codes, listed in the same order in which they are generated. These POST codes appear as a four-digit string that is a combination of two-digit output from primary I/O port 80 and two-digit output from secondary I/O port 81. In the POST codes listed in [TABLE A-1](#), the first two digits are from port 81 and the last two digits are from port 80.

TABLE A-1 POST Codes

Post Code	Description
00d0	Coming out of POR, PCI configuration space initialization, Enabling 8111's SMBus.
00d1	Keyboard controller BAT, Waking up from PM, Saving power-on CPUID in scratch CMOS.
00d2	Disable cache, full memory sizing, and verify that flat mode is enabled.
00d3	Memory detections and sizing in boot block, cache disabled, IO APIC enabled.
01d4	Test base 512KB memory. Adjust policies and cache first 8MB.
01d5	Bootblock code is copied from ROM to lower RAM. BIOS is now executing out of RAM.
01d6	Key sequence and OEM specific method is checked to determine if BIOS recovery is forced. If next code is E0, BIOS recovery is being executed. Main BIOS checksum is tested.
01d7	Restoring CPUID; moving bootblock-runtime interface module to RAM; determine whether to execute serial flash.
01d8	Uncompressing runtime module into RAM. Storing CPUID information in memory.
01d9	Copying main BIOS into memory.
01da	Giving control to BIOS POST.
0004	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. If the CMOS checksum is bad, update CMOS with power-on default values.
00c2	Set up boot strap processor for POST. This includes frequency calculation, loading BSP microcode, and applying user requested value for GART Error Reporting setup question.
00c3	Errata workarounds applied to the BSP (#78 & #110).
00c6	Re-enable cache for boot strap processor, and apply workarounds in the BSP for errata #106, #107, #69, and #63 if appropriate.
00c7	HT sets link frequencies and widths to their final values.
000a	Initializing the 8042 compatible Keyboard Controller.
000c	Detecting the presence of Keyboard in KBC port.
000e	Testing and initialization of different Input Devices. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1.

TABLE A-1 POST Codes *(Continued)*

Post Code	Description
8600	Preparing CPU for booting to OS by copying all of the context of the BSP to all application processors present. NOTE: APs are left in the CLI HLT state.
de00	Preparing CPU for booting to OS by copying all of the context of the BSP to all application processors present. NOTE: APs are left in the CLI HLT state.
8613	Initialize PM regs and PM PCI regs at Early-POST. Initialize multi host bridge, if system supports it. Setup ECC options before memory clearing. Enable PCI-X clock lines in the 8131.
0024	Uncompress and initialize any platform specific BIOS modules.
862a	BBS ROM initialization.
002a	Generic Device Initialization Manager (DIM) - Disable all devices.
042a	ISA PnP devices - Disable all devices.
052a	PCI devices - Disable all devices.
122a	ISA devices - Static device initialization.
152a	PCI devices - Static device initialization.
252a	PCI devices - Output device initialization.
202c	Initializing different devices. Detecting and initializing the video adapter installed in the system that have optional ROMs.
002e	Initializing all the output devices.
0033	Initializing the silent boot module. Set the window for displaying text information.
0037	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.
4538	PCI devices - IPL device initialization.
5538	PCI devices - General device initialization.
8600	Preparing CPU for booting to OS by copying all of the context of the BSP to all application processors present. NOTE: APs are left in the CLI HLT state.

POST Code Checkpoints

The POST code checkpoints are the largest set of checkpoints during the BIOS pre-boot process. [TABLE A-2](#) describes the type of checkpoints that might occur during the POST portion of the BIOS. These two-digit checkpoints are the output from primary I/O port 80.

TABLE A-2 POST Code Checkpoints

Post Code	Description
03	Disable NMI, Parity, video for EGA, and DMA controllers. At this point, only ROM accesses are to the GPNV. If BB size is 64K, require to turn on ROM Decode below FFFF0000h. It should allow USB to run in E000 segment. The HT must program the NB specific initialization and OEM specific initialization can program if it need at beginning of BIOS POST, like overriding the default values of Kernel Variables.
04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system.
05	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.
06	Do R/W test to CH-2 count reg. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to "POSTINT1ChHandlerBlock."
C0	Early CPU Init Start--Disable Cache--Init Local APIC.
C1	Set up boot strap processor information.
C2	Set up boot strap processor for POST. This includes frequency calculation, loading BSP microcode, and applying user requested value for GART Error Reporting setup question.
C3	Errata workarounds applied to the BSP (#78 & #110).
C5	Enumerate and set up application processors. This includes microcode loading, and workarounds for errata (#78, #110, #106, #107, #69, #63).
C6	Re-enable cache for boot strap processor, and apply workarounds in the BSP for errata #106, #107, #69, and #63 if appropriate. In case of mixed CPU steppings, errors are sought and logged, and an appropriate frequency for all CPUs is found and applied. NOTE: APs are left in the CLI HLT state.
C7	The HT sets link frequencies and widths to their final values. This routine gets called after CPU frequency has been calculated to prevent bad programming.
0A	Initializes the 8042 compatible Keyboard Controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of Keyboard in KBC port.

TABLE A-2 POST Code Checkpoints *(Continued)*

Post Code	Description
0E	Testing and initialization of different Input Devices. Also, update the Kernel Variables. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and Silent logo modules.
13	Initialize PM regs and PM PCI regs at Early-POST, Initialize multi host bridge, if system support it. Setup ECC options before memory clearing. REDIRECTION causes corrected data to written to RAM immediately. CHIPKILL provides 4 bit error det/corr of x4 type memory. Enable PCI-X clock lines in the 8131.
20	Relocate all the CPUs to a unique SMBASE address. The BSP will be set to have its entry point at A000:0. If less than 5 CPU sockets are present on a board, subsequent CPUs entry points will be separated by 8000h bytes. If more than 4 CPU sockets are present, entry points are separated by 200h bytes. CPU module will be responsible for the relocation of the CPU to correct address. NOTE: APs are left in the INIT state.
24	Uncompress and initialize any platform specific BIOS modules.
30	Initialize System Management Interrupt.
2A	Initializes different devices through DIM.
2C	Initializes different devices. Detects and initializes the video adapter installed in the system that have optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.
38	Initializes different devices through DIM.
39	Initializes DMAC-1 and DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, Check for DEL or ESC keys to limit memory test. Display total memory in the system.
3C	By this point, RAM read/write test is completed, program memory holes or handle any adjustments needed in RAM size with respect to NB. Test if HT Module found an error in BootBlock and CPU compatibility for MP environment.
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, ... etc.) successfully installed in the system and update the BDA, EBDA, ... etc.
50	Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory.

TABLE A-2 POST Code Checkpoints *(Continued)*

Post Code	Description
60	Initializes NUM-LOCK status and programs the KBD typematic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7A	Initializes remaining option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to the user and gets the user response for error.
87	Execute BIOS setup if needed/requested.
8C	After all device initialization is done, programmed any user selectable parameters relating to NB/SB, such as timing parameters, non-cacheable regions and the shadow RAM cacheability, and do any other NB/SB/PCIX/OEM specific programming needed during Late-POST. Background scrubbing for DRAM, and L1 and L2 caches are set up based on setup questions. Get the DRAM scrub limits from each node.
8D	Build ACPI tables (if ACPI is supported).
8E	Program the peripheral parameters. Enable/Disable NMI as selected.
90	Late POST initialization of system management interrupt.
A0	Check boot password if installed.
A1	Clean-up work needed before booting to OS.
A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.
A4	Initialize runtime language module.
A7	Displays the system configuration screen if enabled. Initialize the CPUs before boot, which includes the programming of the MTRRs.
A8	Prepare CPU for OS boot including final MTRR values.
A9	Wait for user input at config display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector. Deinitializes the ADM module.
AB	Prepare BBS for Int 19 boot.
AC	Any kind of Chipsets (NB/SB) specific programming needed during End- POST, just before giving control to runtime code booting to OS. Programmed the system BIOS (0F0000h shadow RAM) cacheability. Ported to handle any OEM specific programming needed during End-POST. Copy OEM specific data from POST_DSEG to RUN_CSEG.

TABLE A-2 POST Code Checkpoints *(Continued)*

Post Code	Description
B1	Save system context for ACPI.
00	Prepares CPU for booting to OS by copying all of the context of the BSP to all application processors present. NOTE: APs are left in the CLIHLT state.
61-70	OEM POST Error. This range is reserved for chipset vendors and system manufacturers. The error associated with this value may be different from one platform to the next.

Status Indicator LEDs

This appendix describes the locations and definitions of the system LEDs.

External Status Indicator LEDs

FIGURE B-1 and FIGURE B-2 show the locations of the external status indicator LEDs. A Sun Fire X4200 server is pictured, but the LED locations are the same for the Sun Fire X4100 server. Refer to TABLE B-1 and TABLE B-2 for descriptions of the LED behavior, which differs slightly for Sun Fire X4100 and Sun Fire X4200 servers.

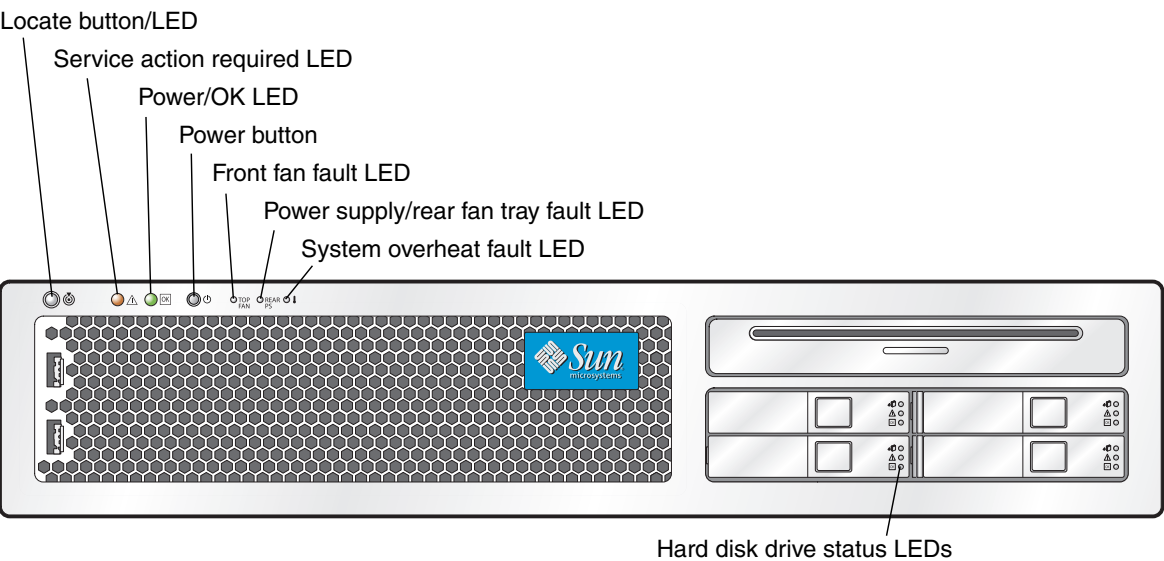


FIGURE B-1 Sun Fire X4200 Server Front Panel LEDs

TABLE B-1 Front Panel LED Functions

LED Name	Description
Locate button/LED	<p>This LED helps you to identify which system in the rack you are working on in a rack full of servers.</p> <ul style="list-style-type: none">• Push and release this button to make the Locate LED blink for 30 minutes.• Hold down the button for 5 seconds to initiate a "push-to-test" mode that illuminates all other LEDs both inside and outside of the chassis for 15 seconds.
Service Action Required LED	<p>This LED has two states:</p> <ul style="list-style-type: none">• Off: Normal operation.• Slow Blinking: An event that requires a service action has been detected.
Power/OK LED	<p>This LED has three states:</p> <ul style="list-style-type: none">• Off: Server main power and standby power are off.• Blinking: Server is in standby power mode, with AC power applied to only the GRASP board and the power supply fans.• On: Server is in main power mode with AC power supplied to all components.
Front Fan Fault LED	<p>This LED lights when there is a failed front cooling fan module. LEDs on the individual fan modules indicate which fan module has failed.</p>
Power Supply/Rear Fan Tray Fault LED	<p>This LED lights when:</p> <ul style="list-style-type: none">• Two power supplies are present in the system but only one has AC power connected. To clear this condition either plug in the second power supply or remove it from the chassis.• Any voltage related event occurs in the system. For CPU-related voltage errors the associated CPU Fault LED will also be illuminated.• (For Sun Fire X4200 only) When the rear fan tray has failed or is removed.
System Overheat Fault LED	<p>This LED lights when an upper temperature limit is detected.</p>
Hard Disk Drive Status LEDs	<p>The hard disk drives have three LEDs:</p> <ul style="list-style-type: none">• Top LED (blue): Reserved for future use.• Middle LED (amber): Hard disk drive failed.• Bottom LED (green): Hard disk drive is OK.

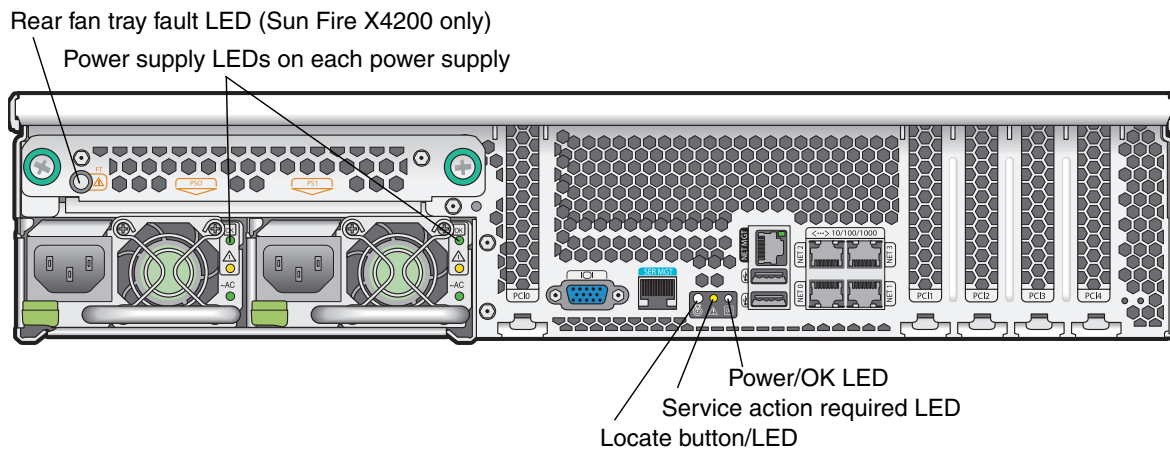


FIGURE B-2 Sun Fire X4200 Server Back Panel LEDs

TABLE B-2 Back Panel LED Functions

LED Name	Description
Rear Fan Tray Fault LED (The rear fan tray and the LED are present only in Sun Fire X4200 servers.)	This LED has two states: <ul style="list-style-type: none"> Off: Fan module is OK. Lit (amber): Fan tray has failed.
Power Supply LEDs	The power supplies have three LEDs: <ul style="list-style-type: none"> Top LED (green): Power supply is OK. Middle LED (amber): Power supply failed. Bottom LED (green): AC power to power supply is OK.

TABLE B-2 Back Panel LED Functions

LED Name	Description
Locate button/LED (Same function as on front panel.)	<p>This LED helps you to identify which system in the rack you are working on in a rack full of servers.</p> <ul style="list-style-type: none">• Push and release this button to make the Locate LED blink for 30 minutes.• Hold down the button for 5 seconds to initiate a "push-to-test" mode that illuminates all other LEDs both inside and outside of the chassis for 15 seconds.
Service Action Required LED (Same function as on front panel.)	<p>This LED has two states:</p> <ul style="list-style-type: none">• Off: Normal operation.• Slow Blinking: An event that requires a service action has been detected.
Power/OK LED (Same function as on front panel.)	<p>This LED has three states:</p> <ul style="list-style-type: none">• Off: Server main power and standby power are off.• Blinking: Server is in standby power mode, with AC power applied to only the GRASP board and the power supply fans.• On: Server is in main power mode with AC power supplied to all components.

Internal Status Indicator LEDs

The Sun Fire X4100 and Sun Fire X4200 servers have internal fault indicator LEDs for the fan modules, the DIMM slots, and the CPUs.

[FIGURE B-3](#) shows the locations of the internal LEDs. See [TABLE B-3](#) for descriptions of the LED behavior.

Note – To see the LEDs in the ejector levers of the DIMM slots, you must put the server in standby power mode (press the front panel Power button, but do not disconnect the AC power cords).

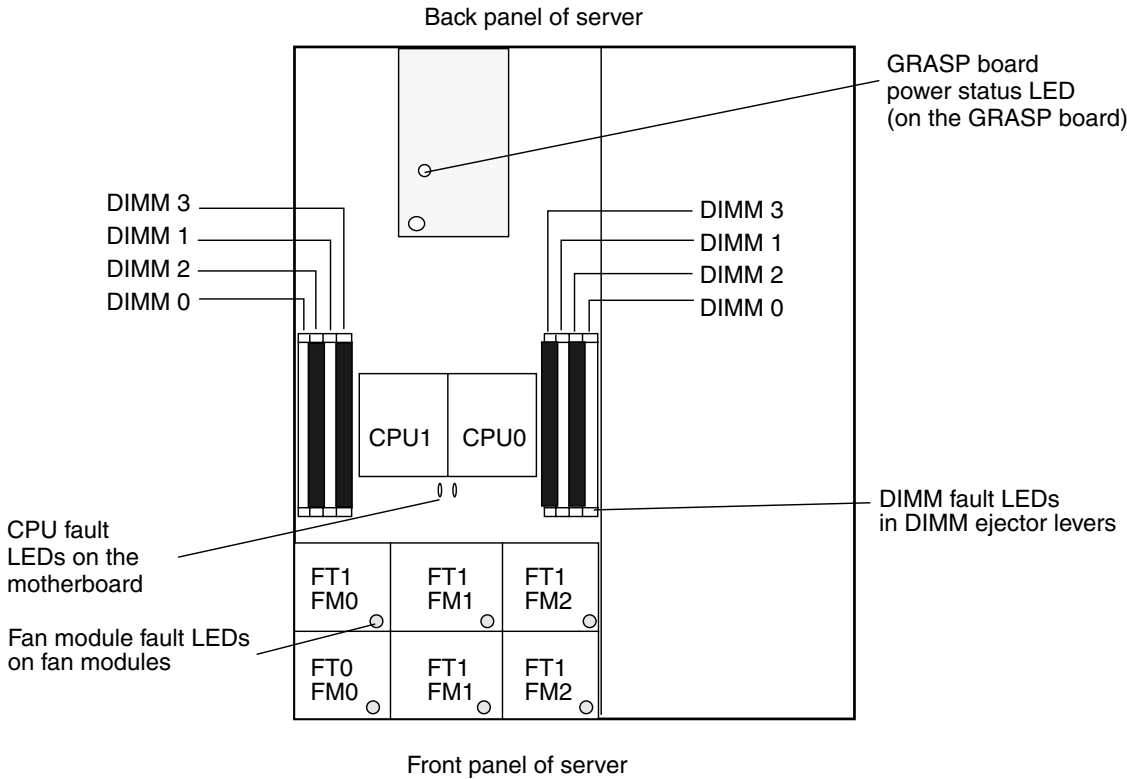


FIGURE B-3 Sun Fire X4100 and Sun Fire X4200 Internal LED Locations

TABLE B-3 Internal LED Functions

LED Name	Description
DIMM Fault LED (The ejector levers on the DIMM slots hold the LEDs.)	This LED has two states: <ul style="list-style-type: none">• Off: DIMM is OK.• Lit (amber): DIMM has failed.
CPU Fault LED (on motherboard)	This LED has two states: <ul style="list-style-type: none">• Off: CPU is OK.• Lit (amber): CPU has encountered a voltage or heat error condition.
Fan Module Fault LED	This LED has two states: <ul style="list-style-type: none">• Off: Fan module is OK.• Lit (amber): Fan module has failed.
GRASP Board Power Status LED	This LED has two states: <ul style="list-style-type: none">• Off: standby power is not reaching the GRASP board.• Lit (green): 3.3V standby power is reaching the GRASP board.

Using the ILOM SP GUI to View System Information

This appendix contains information about using the Integrated Lights-Out Manager (ILOM) Service processor (SP) GUI to view monitoring and maintenance information for your server.

- [“Making a Serial Connection to the SP” on page 40](#)
- [“Viewing ILOM SP Event Logs” on page 41](#)
- [“Viewing Replaceable Component Information” on page 44](#)
- [“Viewing Temperature, Voltage, and Fan Sensor Readings” on page 46](#)

For more information on using the ILOM SP GUI to maintain the server (for example, configuring alerts), refer to the *Integrated Lights-Out Manager (ILOM) Administration Guide*, 819-1160, 819-1160, or the System Management portion of the Online Information System.

If any of the logs or information screens indicate a DIMM error, see [“Troubleshooting DIMM Problems” on page 8](#) and [“Isolating and Correcting DIMM ECC Errors” on page 13](#).

If the problem with the server is not evident after viewing ILOM SP logs and information, continue with [“SunVTS Diagnostic Tests” on page 15](#).

Making a Serial Connection to the SP

1. Connect a serial cable from the RJ-45 Serial Mgt port on your ILOM SP to a terminal device.
2. Press ENTER on the terminal device to establish a connection between that terminal device and the ILOM SP.

Note – If you are connecting to the serial port on the SP before it has been powered up or during its power-up sequence, you will see bootstrap messages displayed.

The service processor eventually displays a login prompt. For example:

```
SUNSP0003BA84D777 login:
```

The first string in the prompt is the default host name for the ILOM SP. It consists of the prefix `SUNSP` and the MAC address of the ILOM SP. The MAC address for each ILOM SP is unique.

3. Log in to the SP and type the default user name, `root`, with the default password, `changeme`.

Once you have successfully logged in to the SP, it displays its default command prompt.

```
->
```

4. To start the serial console, type the following commands:

```
cd /SP/console
start
```

5. Determine whether you could successfully connect to the SP:

- If you could *not* connect to the SP, there is likely a problem with the graphics-redirect and service processor (GRASP) board. Replace this board and then repeat this procedure.
- If you could connect to the SP, continue with the following procedures:
 - [“Viewing ILOM SP Event Logs” on page 41](#)
 - [“Viewing Replaceable Component Information” on page 44](#)
 - [“Viewing Temperature, Voltage, and Fan Sensor Readings” on page 46](#)

Viewing ILOM SP Event Logs

The IPMI system event log (SEL) provides status information about the Sun Fire X4100 or X4200 server's hardware and software to the ILOM software, which displays the events in the ILOM web GUI. Events are notifications that occur in response to some actions.

1. Log in to the SP as Administrator or Operator to reach the ILOM web GUI:

a. Type the IP address of the server's SP into your web browser.

The Sun Integrated Lights Out Manager Login screen is displayed.

b. Type your user name and password.

When you first try to access the ILOM Service Processor, you are prompted to type the default user name and password. The default user name and password are:

Default user name: **root**

Default password: **changeme**

2. From the System Monitoring tab, choose Event Logs.

The System Event Logs page is displayed. See [FIGURE C-1](#).

ABOUT REFRESH LOG OUT

User: root (Administrator) Server: SUNSP020000970192

Sun™ Integrated Lights Out Manager

System Information System Monitoring Configuration User Management Remote Control Maintenance

Sensor Readings Event Logs Locator Indicator

System Event Logs

View sensor-specific, BIOS-generated, or system management software event logs.

Select an event log category:

Sensor-Specific Events

Event Log: 4 event entries

Event ID /	Time Stamp /	Sensor Name /	Sensor Type /	Description /
4	12/31/1969 16:01:01	ps1.vinok	Power Supply	State Asserted - Asserted
3	12/31/1969 16:01:01	ps0.prsnt	Entity Presence	Device Removed / Device Absent - Asserted
2	12/31/1969 16:00:57	ps1.prsnt	Entity Presence	Device Inserted / Device Present - Asserted
1	12/31/1969 16:00:56	ps1.pwrok	Power Supply	State Deasserted - Asserted

FIGURE C-1 Sample System Event Logs Screen

3. Select a category of event that you want to view in the log from the drop-down list box.

You can select from the following types of events:

- Sensor-specific events. These events relate to a specific sensor for a component, for example, a fan sensor or a power supply sensor.
- BIOS-generated events. These events relate to error messages generated in the BIOS.
- System management software events. These events relate to events that occur within the ILOM software.

After you have selected a category of event, the Event Log table is updated with the specified events. The fields in the Event Log are described in [TABLE C-1](#).

TABLE C-1 Event Log Fields

Field	Description
Event ID	The number of the event, in sequence from number 1.
Time Stamp	The day and time the event occurred. If the Network Time Protocol (NTP) server is enabled to set the SP time, the SP clock will use Universal Coordinated Time (UTC). For more information about time stamps, see “Interpreting Event Log Time Stamps” on page 43 .
Sensor Name	The name of a component for which an event was recorded. The sensor name abbreviations correspond to these components: sys: System or chassis <ul style="list-style-type: none">• p0: Processor 0• p1: Processor 1• io: I/O board• ps: Power supply• fp: Front panel• ft: Fan tray• mb: Motherboard
Sensor Type	The type of sensor for the specified event.
Description	A description of the event.

4. To clear the event log, click the Clear Event Log button.

A confirmation dialog box is displayed.

5. Click OK to clear all entries in the log.

6. If the problem with the server is not evident after viewing ILOM SP logs and information, continue with [“SunVTS Diagnostic Tests” on page 15](#).

Interpreting Event Log Time Stamps

The system event log time stamps are related to the service processor clock settings. If the clock settings change, the change is reflected in the time stamps.

When the service processor reboots, the SP clock is set to Thu Jan 1 00:00:00 UTC 1970. The SP reboots as a result of the following:

- A complete system unplug/replug power cycle
- An IPMI command; for example, `mc reset cold`
- A command-line interface (CLI) command; for example, `reset /SP`
- ILOM web GUI operation; for example, from the Maintenance tab, selecting Reset SP
- An SP firmware upgrade

After an SP reboot, the SP clock is changed by the following:

- When the host is booted. The host's BIOS unconditionally sets the SP time to that indicated by the host's RTC. The host's RTC is set by the following operations:
 - When the host's CMOS is cleared as a result of changing the host's RTC battery or inserting the CMOS-clear jumper on the motherboard. The host's RTC starts at Jan 1 00:01:00 2002.
 - When the host's operating system sets the host's RTC. The BIOS does not consider time zones. Solaris and Linux software respect time zones and will set the system clock to UTC. Therefore, after the OS adjusts the RTC, the time set by the BIOS will be UTC.
 - When the users sets the RTC using the host BIOS Setup screen.
- Continuously via NTP if NTP is enabled on the SP ? NTP jumping is enabled to recover quickly from an erroneous update from the BIOS or user. NTP servers provide UTC time. Therefore, if NTP is enabled on the SP, the SP clock will be in UTC.
- Via the CLI, ILOM web GUI and IPMI

Viewing Replaceable Component Information

Depending on the component you select, information about the manufacturer, component name, serial number, and part number can be displayed.

1. Log in to the SP as Administrator or Operator to reach the ILOM web GUI:

a. Type the IP address of the server's SP into your web browser.

The Sun Integrated Lights Out Manager Login screen is displayed.

b. Type your user name and password.

When you first try to access the ILOM Service Processor, you are prompted to type the default user name and password. The default user name and password are:

Default user name: **root**

Default password: **changeme**

2. From the System Information tab, choose Components.

The Replaceable Component Information page is displayed. See [FIGURE C-2](#).

ABOUT

REFRESH

LOG OUT

User: root (Administrator) Server: SUNSP0003BA84D7B6

Sun™ Integrated Lights Out Manager

Sun™ Microsystems, Inc.

java™

System Information

System Monitoring

Configuration

User Management

Remote Control

Maintenance

Versions

Session Time-Out

Components

Replaceable Component Information

View component part numbers, serial numbers and manufacturing information.

Select a device:

mb fru

Chassis Information:	
Type	: Rack Mount Chassis
Part Number	: 541-0250-01
Serial Number	: 0060HSI-0503AM0387
Board Information:	
Manufacturer	: BENCHMARK ELECTRONICS
Product Name	: ASY_MOTHERBRD_GALAXY1/2
Serial Number	: 0060HSV-0503000313
Part Number	: 500-6974-01
Product Information:	
Manufacturer Name	: SUN MICROSYSTEMS
Product Name	: GALAXY 1
Serial Number	: 0503AMF040
Part Number	: 602-2813-01

FIGURE C-2 Sample Replaceable Component Information Screen

3. Select a component from the drop-down list box.

Information about the selected component is displayed.

4. If the problem with the server is not evident after viewing ILOM SP logs and information, continue with “[SunVTS Diagnostic Tests](#)” on page 15.

Viewing Temperature, Voltage, and Fan Sensor Readings

This section explains how to view the Sun Fire X4100 or X4200 server temperature, voltage, and fan sensor readings.

There are a total of six temperature sensors that are monitored. They all generate IPMI events that will be logged in to the system event log (SEL) when an upper threshold is exceeded. Three of these sensor readings are used to adjust the fan speeds and perform other actions, such as illuminating LEDs and powering off the chassis. These sensors and their respective thresholds are as follows:

- Front panel ambient temperature (fp.t_amb)
 - Upper non-critical: 30 degrees C
 - Upper critical: 35 degrees C
 - Upper non-recoverable: 40 degrees C
- CPU 0 (p0.t_core) and CPU 1 (p1.t_core) die temperatures
 - Upper non-critical: 55 degrees C
 - Upper critical: 65 degrees C
 - Upper non-recoverable: 75 degrees C

There are three other temperature sensors:

- I/O board ambient temperature (io.t_amb)
- Motherboard ambient temperature (mb.t_amb)
- Power distribution board ambient temperature (pdb.t_amb)

1. Log in to the SP as Administrator or Operator to reach the ILOM web GUI:

a. Type the IP address of the server's SP into your web browser.

The Sun Integrated Lights Out Manager Login screen is displayed.

b. Type your user name and password.

When you first try to access the ILOM Service Processor, you are prompted to type the default user name and password. The default user name and password are:

Default user name: **root**

Default password: **changeme**

2. From the System Monitoring tab, choose Sensor Readings.

The Sensor Readings page is displayed. See [FIGURE C-3](#).

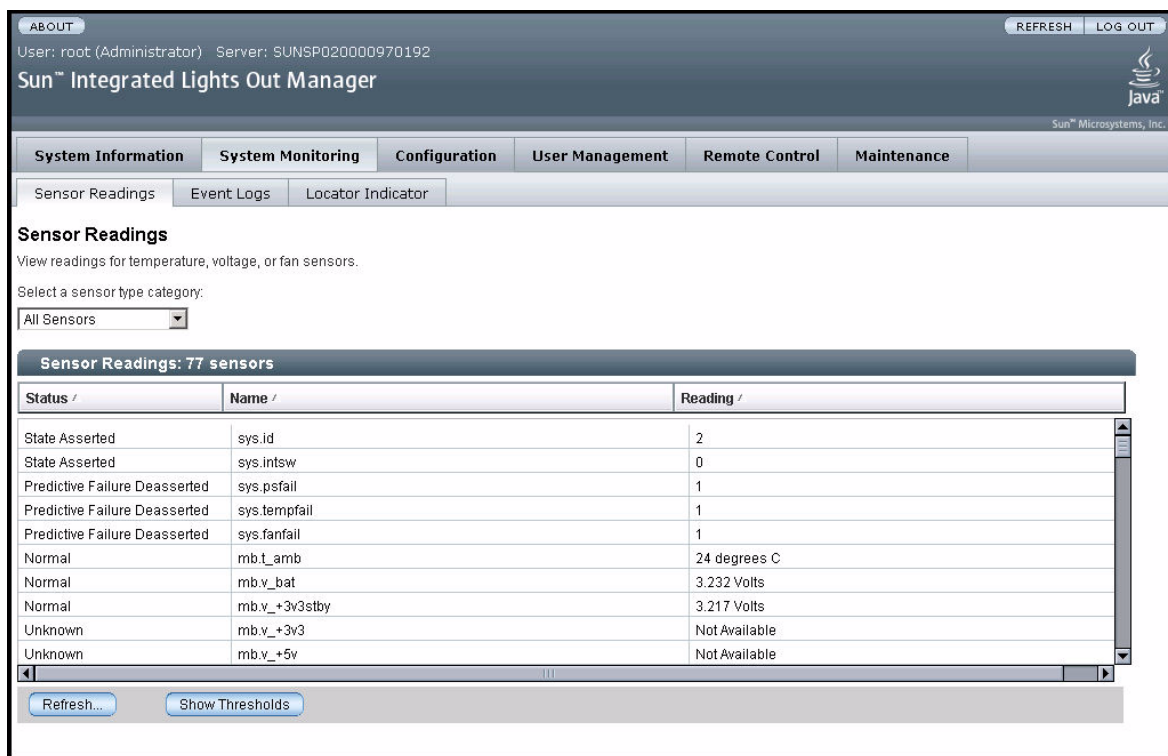


FIGURE C-3 Sample Sensor Readings Screen

3. Select the type of sensor readings that you want to view from the drop-down list box.

You can select All Sensors, Temperature Sensors, Voltage Sensors, or Fan Sensors.

The sensor readings are displayed. The Sensor Readings fields are described in [TABLE C-2](#).

TABLE C-2 Event Log Fields

Field	Description
Status	Reports the status of the sensor, including State Asserted, State Deasserted, Predictive Failure, Device Inserted/Device Present, Device Removed/Device Absent, Unknown, and Normal.
Name	Reports the name of the sensor. The names correspond to these components: <ul style="list-style-type: none">• sys: System or chassis• bp: Back panel• fp: Front panel• mb: Motherboard• io: I/O board• p0: Processor 0• p1: Processor 1• ft0: Fan tray 0• ft1: Fan tray 1• pdb: Power distribution board• ps0: Power supply 0• ps1: Power supply 1
Reading	Reports the rpm, temperature, and voltage measurements.

4. Click the Refresh button to update the sensor readings to their current status.

5. Click the Show Thresholds button to display the settings that trigger alerts.

The Sensor Readings table is updated. See the example in [FIGURE C-4](#).

For example, if system temperature reaches 30 C, the service processor will send an alert. Sensor thresholds include the following:

- Low/High NR: Low or high non-recoverable
- Low/High CR: Low or high critical
- Low/High NC: Low or high non-critical

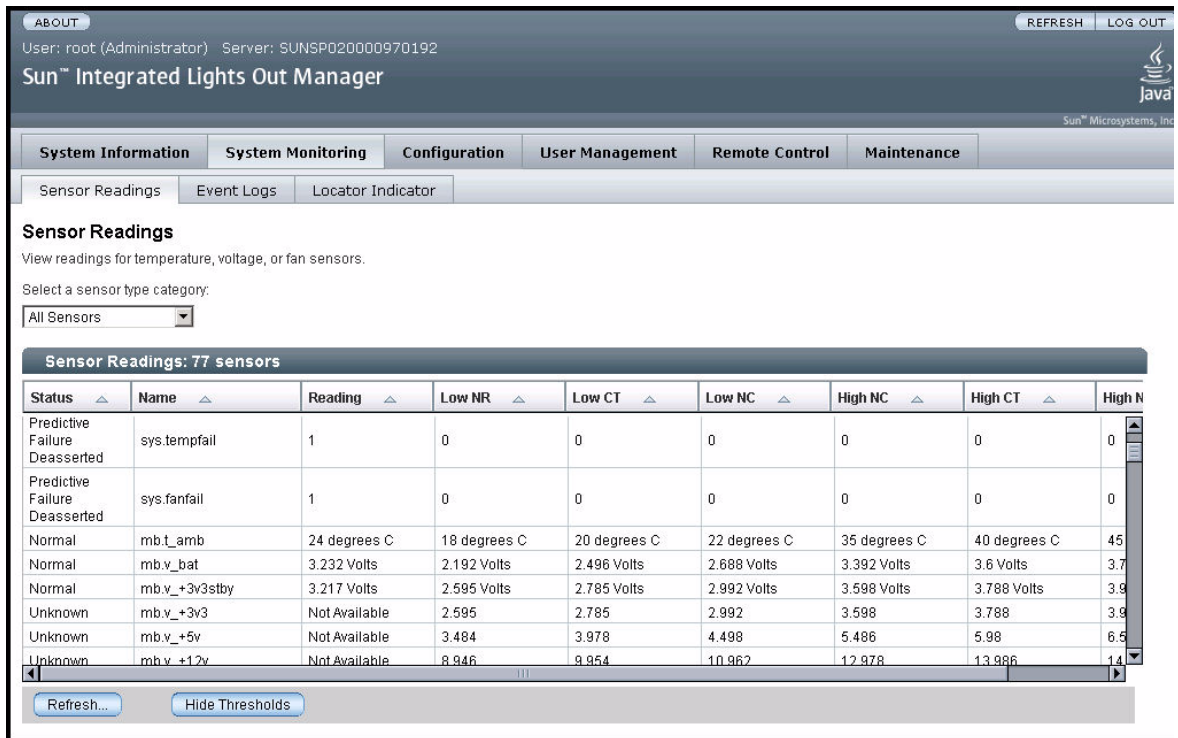


FIGURE C-4 Sample Sensor Readings Screen, With Thresholds Shown

6. Click the Hide Thresholds button to revert to the sensor readings.

The sensor readings are redisplayed, without the thresholds.

7. If the problem with the server is not evident after viewing ILOM SP logs and information, continue with “[SunVTS Diagnostic Tests](#)” on page 15.

Using IPMItool to View System Information

This appendix contains information about using the Intelligent Platform Management Interface (IPMI) to view monitoring and maintenance information for your server. This appendix contains the following sections:

- [“About IPMI” on page 52](#)
- [“About IPMItool” on page 52](#)
- [“Connecting to the Server With IPMItool” on page 53](#)
- [“Using IPMItool to Read Sensors” on page 55](#)
- [“Using IPMItool to View the ILOM SP System Event Log” on page 59](#)
- [“Viewing Component Information With IPMItool” on page 61](#)
- [“Viewing and Setting Status LEDs” on page 62](#)

About IPMI

IPMI is an open-standard hardware management interface specification that defines a specific way for embedded management subsystems to communicate. IPMI information is exchanged through baseboard management controllers (BMCs), which are located on IPMI-compliant hardware components. Using low-level hardware intelligence instead of the operating system has two main benefits: first, this configuration allows for out-of-band server management, and second, the operating system is not burdened with transporting system status data.

Your Sun Fire X4100 or Sun Fire X4200 ILOM Service Processor (SP) is IPMI v2.0 compliant. You can access IPMI functionality through the command line with the IPMITool utility either in-band or out-of-band. Additionally, you can generate an IPMI-specific trap from the web interface, or manage the server's IPMI functions from any external management solution that is IPMI v1.5 or v2.0 compliant. For more information about the IPMI v2.0 specification, go to

<http://www.intel.com/design/servers/ipmi/spec.htm#spec2>.

About IPMITool

IPMITool is included on the Sun Fire X4100 and Sun Fire X4200 Servers Resource CD (705-1438). IPMITool is a simple command-line interface that is useful for managing IPMI-enabled devices. You can use this utility to perform IPMI functions with a kernel device driver or over a LAN interface. IPMITool enables you to manage system hardware components, monitor system health, and monitor and manage system environmentals, independent of the operating system.

Locate IPMITool and its related documentation on your Sun Fire X4100 and Sun Fire X4200 Servers Resource CD, or download this tool from the following URL:

<http://ipmitool.sourceforge.net/>

IPMITool Man Page

After you install the IPMITool package, you can access detailed information about command usage and syntax from the man page that is installed. From a command line, type this command:

```
man ipmitool
```

Connecting to the Server With IPMItool

To connect over a remote interface you must supply a username and password. The default user with admin-level access is **root** with password **changeme**. This means you must use the **-U** and **-P** parameters to pass both username and password on the command line, as shown in the following example:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme chassis status
```

Note – If you encounter command-syntax problems with your particular operating system, you can use the **ipmitool -h** command and parameter to determine which parameters can be passed with the **ipmitool** command on your operating system. Also refer to the **ipmitool** man page by typing **man ipmitool**.

Note – In the example commands shown in this appendix, the default username, **root**, and default password, **changeme** are shown. You should type the user name and password that has been set for the server.

Enabling the Anonymous User

In order to enable the Anonymous/NULL user you must alter the privilege level on that account. This will let you connect without supplying a **-U** user option on the command line. The default password for this user is **anonymous**.

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme channel setaccess 1 1  
privilege=4
```

```
ipmitool -I lanplus -H <IPADDR> -P anonymous user list
```

Changing the Default Password

You can also change the default passwords for a particular user ID. First get a list of users and find the ID for the user you wish to change, then supply it with a new password, as shown in the following command sequence:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme user list
```

ID	Name	Callin	Link Auth	IPMI Msg	Channel Priv Limit
1		false	false	true	NO ACCESS
2	root	false	false	true	ADMINISTRATOR

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme user set password 2  
newpass
```

```
ipmitool -I lanplus -H <IPADDR> -U root -P newpass chassis status
```

Configuring an SSH Key

You can use IPMITool to configure an SSH key for a remote shell user. To do this, first determine the user ID for the desired remote SP user with the user list command:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme user list
```

Then supply the user ID and the location of the RSA or DSA public key to use with the `ipmitool sunoem sshkey` command. For example:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sunoem sshkey set 2  
id_rsa.pub
```

```
Setting SSH key for user id 2.....done
```

You can also clear the key for a particular user, for example:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sunoem sshkey del 2
```

```
Deleted SSH key for user id 2
```

Using IPMItool to Read Sensors

For more information about supported IPMI 2.0 commands and the sensor naming for this server, also refer to the *Integrated Lights-Out Manager (ILOM) Administration Guide*, 819-1160.

Reading Sensor Status

There are a number of ways to read sensor status, from a broad overview that lists all sensors, to querying individual sensors and returning detailed information on them.

Reading All Sensors

To get a list of all sensors in these servers and their status, use the `sdr list` command with no arguments. This returns a large table with every sensor in the system and its status.

The five fields of the output lines, as read from left to right are:

1. IPMI sensor ID (16-character maximum)
2. IPMI sensor number
3. Sensor status, indicating which thresholds have been exceeded
4. Entity ID and instance
5. Sensor reading

For example:

```
fp.t_amb          | 0Ah | ok   | 12.0 | 22 degrees C
```

Reading Specific Sensors

Although the default output is a long list of sensors, it is possible to refine the output to see only specific sensors. The `sdr list` command can use an optional argument to limit the output to sensors of a specific type. [TABLE D-1](#) describes the available sensor arguments.

TABLE D-1 IPMItool Sensor Arguments

Argument	Description	Sensors
<code>all</code>	All sensor records	All sensors
<code>full</code>	Full sensor records	Temperature, voltage, and fan sensors
<code>compact</code>	Compact sensor records	Digital Discrete: failure and presence sensors
<code>event</code>	Event-only records	Sensors used only for matching with SEL records
<code>mcloc</code>	MC locator records	Management Controller sensors
<code>generic</code>	Generic locator records	Generic devices: LEDs
<code>fru</code>	FRU locator records	FRU devices

For example, to see only the temperature, voltage, and fan sensors, you would use the following command, with the `full` argument.

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sdr elist full
```

```
fp.t_amb      | 0Ah | ok | 12.0 | 22 degrees C
ps.t_amb      | 11h | ok | 10.0 | 21 degrees C
ps0.f0.speed  | 15h | ok | 10.0 | 11000 RPM
ps1.f0.speed  | 19h | ok | 10.1 | 0 RPM
mb.t_amb      | 1Ah | ok | 7.0  | 25 degrees C
mb.v_bat      | 1Bh | ok | 7.0  | 3.18 Volts
mb.v_+3v3stby | 1Ch | ok | 7.0  | 3.17 Volts
mb.v_+3v3     | 1Dh | ok | 7.0  | 3.34 Volts
mb.v_+5v      | 1Eh | ok | 7.0  | 5.04 Volts
mb.v_+12v     | 1Fh | ok | 7.0  | 12.22 Volts
mb.v_-12v     | 20h | ok | 7.0  | -12.20 Volts
mb.v_+2v5core | 21h | ok | 7.0  | 2.54 Volts
mb.v_+1v8core | 22h | ok | 7.0  | 1.83 Volts
mb.v_+1v2core | 23h | ok | 7.0  | 1.21 Volts
io.t_amb      | 24h | ok | 15.0 | 21 degrees C
p0.t_core     | 2Bh | ok | 3.0  | 44 degrees C
p0.v_+1v5     | 2Ch | ok | 3.0  | 1.56 Volts
p0.v_+2v5core | 2Dh | ok | 3.0  | 2.64 Volts
p0.v_+1v25core | 2Eh | ok | 3.0  | 1.32 Volts
p1.t_core     | 34h | ok | 3.1  | 40 degrees C
p1.v_+1v5     | 35h | ok | 3.1  | 1.55 Volts
p1.v_+2v5core | 36h | ok | 3.1  | 2.64 Volts
p1.v_+1v25core | 37h | ok | 3.1  | 1.32 Volts
ft0.fm0.f0.speed | 43h | ok | 29.0 | 6000 RPM
```

ft0.fm1.f0.speed	44h	ok	29.1	6000 RPM
ft0.fm2.f0.speed	45h	ok	29.2	6000 RPM
ft1.fm0.f0.speed	46h	ok	29.3	6000 RPM
ft1.fm1.f0.speed	47h	ok	29.4	6000 RPM
ft1.fm2.f0.speed	48h	ok	29.5	6000 RPM

You can also generate a list of all sensors for a specific Entity. Use the list output to determine which entity you are interested in seeing, then use the `sdr entity` command to get a list of all sensors for that entity. This command accepts an entity ID and an optional entity instance argument. If an entity instance is not specified, it will display all instances of that entity.

The entity ID is given in the 4th field of the output, as read from left to right. For example, in the output shown in the previous example, all the fans are entity 29. The last fan listed (29.5) is entity 29, with instance 5:

ft1.fm2.f0.speed	48h	ok	29.5	6000 RPM
------------------	-----	----	------	----------

For example, to see all fan-related sensors, you would use the following command that uses the entity 29 argument.

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sdr entity 29
```

ft0.fm0.fail	3Dh	ok	29.0	Predictive Failure Deasserted
ft0.fm0.led	00h	ns	29.0	Generic Device @20h:19h.0
ft0.fm1.fail	3Eh	ok	29.1	Predictive Failure Deasserted
ft0.fm1.led	00h	ns	29.1	Generic Device @20h:19h.1
ft0.fm2.fail	3Fh	ok	29.2	Predictive Failure Deasserted
ft0.fm2.led	00h	ns	29.2	Generic Device @20h:19h.2
ft1.fm0.fail	40h	ok	29.3	Predictive Failure Deasserted
ft1.fm0.led	00h	ns	29.3	Generic Device @20h:19h.3
ft1.fm1.fail	41h	ok	29.4	Predictive Failure Deasserted
ft1.fm1.led	00h	ns	29.4	Generic Device @20h:19h.4
ft1.fm2.fail	42h	ok	29.5	Predictive Failure Deasserted
ft1.fm2.led	00h	ns	29.5	Generic Device @20h:19h.5
ft0.fm0.f0.speed	43h	ok	29.0	6000 RPM
ft0.fm1.f0.speed	44h	ok	29.1	6000 RPM
ft0.fm2.f0.speed	45h	ok	29.2	6000 RPM
ft1.fm0.f0.speed	46h	ok	29.3	6000 RPM
ft1.fm1.f0.speed	47h	ok	29.4	6000 RPM
ft1.fm2.f0.speed	48h	ok	29.5	6000 RPM

Other queries can include a particular type of sensor. The command in the following example would return a list of all Temperature type sensors in the SDR.

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sdr type temperature
```

sys.tempfail	03h	ok	23.0	Predictive Failure Deasserted
mb.t_amb	05h	ok	7.0	25 degrees C
fp.t_amb	14h	ok	12.0	25 degrees C
ps.t_amb	1Bh	ok	10.0	24 degrees C
io.t_amb	22h	ok	15.0	23 degrees C
p0.t_core	2Ch	ok	3.0	35 degrees C
p1.t_core	35h	ok	3.1	36 degrees C

Using IPMItool to View the ILOM SP System Event Log

The ILOM SP System Event Log (SEL) provides storage of all system events. You can view the SEL with IPMItool.

Viewing the SEL With IPMItool

View the ILOM SP SEL by using the following command:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sel list
```

```
100 | Pre-Init Time-stamp | Entity Presence #0x16 | Device Absent
200 | Pre-Init Time-stamp | Entity Presence #0x26 | Device Present
300 | Pre-Init Time-stamp | Entity Presence #0x25 | Device Absent
400 | Pre-Init Time-stamp | Phys Security #0x01 | Gen Chassis intrusion
500 | Pre-Init Time-stamp | Entity Presence #0x12 | Device Present
```

You can get detailed event output by using the `sel elist` command instead of `sel list`. The `sel elist` command cross-references event records with sensor data records to produce descriptive event output. It takes longer to execute because it has to read from both the SEL and the Static Data Repository (SDR). For increased speed, generate an SDR cache before using the `sel elist` command. See [“Using the Sensor Data Repository \(SDR\) Cache” on page 60](#).

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sel elist first 3
```

```
100 | Pre-Init Time-stamp | Temperature fp.t_amb | Upper Non-critical
going high | Reading 31 > Threshold 30 degrees C
200 | Pre-Init Time-stamp | Power Supply ps1.pwrok | State Deasserted
300 | Pre-Init Time-stamp | Entity Presence ps1.prsnt | Device Present
```

Certain qualifiers are available to refine and limit the SEL output. If you want to see only the first NUM records, add that as a qualifier to the command. If you want to see the last NUM records, use that qualifier. For example, to see the last three records in the SEL, use this command:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sel elist last 3
```

```
800 | Pre-Init Time-stamp | Entity Presence ps1.prsnt | Device Absent
900 | Pre-Init Time-stamp | Phys Security sys.intsw | Gen Chassis intrusion
a00 | Pre-Init Time-stamp | Entity Presence ps0.prsnt | Device Present
```

If you want to get more detailed information on a particular event, you can use the `sel get ID` command, in which you specify an SEL record ID. For example:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sel get 0x0a00
```

```
SEL Record ID   : 0a00
Record Type     : 02
Timestamp       : 07/06/1970 01:53:58
Generator ID    : 0020
EvM Revision    : 04
Sensor Type     : Entity Presence
Sensor Number   : 12
Event Type      : Generic Discrete
Event Direction : Assertion Event
Event Data (RAW) : 01ffff
Description     : Device Present

Sensor ID       : ps0.prsnt (0x12)
Entity ID       : 10.0
Sensor Type (Discrete): Entity Presence
States Asserted : Availability State
                  [Device Present]
```

In the example above you can see that this particular event is describing that the Power Supply #0 is detected and present.

Clearing the SEL With IPMItool

To clear the SEL, use the `sel clear` command:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sel clear
```

```
Clearing SEL. Please allow a few seconds to erase.
```

Using the Sensor Data Repository (SDR) Cache

When working with the ILOM SP, certain operations can be expensive in terms of execution time and the amount of data transferred. Typically, issuing the `sdr elist` command requires the entire SDR to be read from the SP. Similarly, the `sel elist` command needs to read both the SDR and the SEL from the SP in order to cross-reference events and display useful information.

To speed up these operations, it is possible to pre-cache the static data in the SDR and feed it back into IPMItool. This can have a dramatic effect in the processing time for some commands. In order to generate an SDR cache for later reuse, use the `sdr dump` command. For example:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sdr dump galaxy.sdr
```

```
Dumping Sensor Data Repository to 'galaxy.sdr'
```

After you have generated a cache file, it can be supplied to future invocations of IPMItool with the `-s` option. For example:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme -S galaxy.sdr sel elist
100 | Pre-Init Time-stamp | Entity Presence ps1.prsnt | Device Absent
200 | Pre-Init Time-stamp | Entity Presence io.f0.prsnt | Device Absent
300 | Pre-Init Time-stamp | Power Supply ps0.vinok | State Asserted
...
```

Viewing Component Information With IPMItool

You can view information about system hardware components. The software refers to these components as field-replaceable unit (FRU) devices.

To read the FRU inventory information on these servers, you must first have the FRU ROMs programmed. After that is done, you can see a full list of the available FRU data by using the `fru print` command, as shown in the following example (only two FRU devices are shown in the example, but all devices would be shown).

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme fru print
```

```
FRU Device Description : Builtin FRU Device (ID 0)
  Board Mfg             : BENCHMARK ELECTRONICS
  Board Product          : ASSY,SERV PROCESSOR,X4X00
  Board Serial           : 0060HSV-0523000195
  Board Part Number      : 501-6979-02
  Board Extra            : 000-000-00
  Board Extra            : HUNTSVILLE,AL,USA
  Board Extra            : b302
  Board Extra            : 06
  Board Extra            : GRASP
  Product Manufacturer   : SUN MICROSYSTEMS
  Product Name           : ILOM

FRU Device Description : sp.net0.fru (ID 2)
  Product Manufacturer   : MOTOROLA
  Product Name           : FAST ETHERNET CONTROLLER
  Product Part Number    : MPC8248 FCC
  Product Serial         : 00:03:BA:D8:73:AC
  Product Extra          : 01
  Product Extra          : 00:03:BA:D8:73:AC
...
```

Viewing and Setting Status LEDs

In these servers, all LEDs are active-driven; that is, the SP is responsible for the I2C commands that assert and deassert each GPIO pin for each flash cycle.

The IPMITool command for reading LED status is:

```
ipmitool -I lanplus -H <IPADDR> sunoem led get <sensor ID>
```

The IPMITool command for setting LED status is:

```
ipmitool -I lanplus -H <IPADDR> sunoem led set <sensor ID> <LED mode>
```

It is possible for both of these commands to operate on all sensors at once by substituting **all** for the sensor ID. That way, you can easily get a list of all LEDs and their status with one command.

See [“LED Sensor IDs” on page 62](#) and [“LED Modes” on page 64](#) for information about the variables in these commands.

LED Sensor IDs

All LEDs in these servers are represented by two sensors:

- A Generic Device Locator record describes the location of the sensor in the system. It has an `.led` suffix and is the name that is fed into the `led set` and `led get` commands. You can get a list of all of these sensors by issuing the `sdr list generic` command.
- A Digital Discrete fault sensor monitors the status of the LED pin and is asserted when the LED is active. These sensors have a `.fail` suffix and are used to report events to the SEL.

Each LED has both a descriptor and a status reading sensor, and the two are linked; that is, if you use the `.led` sensor to turn on a particular LED, then the status change is represented in the associated `.fail` sensor. Also for some of these, an event is generated in the SEL. For LEDs that blink on failure instead of steady-on, there events are not generated (this is because display an event every time it flashed in the blink cycle).

[TABLE D-2](#) lists the LED sensor IDs in these servers. See [“Status Indicator LEDs” on page 33](#) for diagrams of the LED locations.

TABLE D-2 LED Sensor IDs

LED Sensor ID	Description
sys.power.led	System Power (front+back)
sys.locate.led	System Locate (front+back)
sys.alert.led	System Alert (front+back)
sys.psfail.led	System Power Supply Failed
sys.tempfail.led	System Over Temperature
sys.fanfail.led	System Fan Failed
bp.power.led	Back Panel Power
bp.locate.led	Back Panel Locate
bp.alert.led	Back Panel Alert
fp.power.led	Front Panel Power
fp.locate.led	Front Panel Locate
fp.alert.led	Front Panel Alert
io.hdd0.led	Hard Disk 0 Failed
io.hdd1.led	Hard Disk 1 Failed
io.hdd2.led	Hard Disk 2 Failed
io.hdd3.led	Hard Disk 3 Failed
io.f0.led	I/O Fan Failed
p0.led	CPU 0 Failed
p0.d0.led	CPU 0 DIMM 0 Failed
p0.d1.led	CPU 0 DIMM 1 Failed
p0.d2.led	CPU 0 DIMM 2 Failed
p0.d3.led	CPU 0 DIMM 3 Failed
p1.led	CPU 1 Failed
p1.d0.led	CPU 1 DIMM 0 Failed
p1.d1.led	CPU 1 DIMM 1 Failed
p1.d2.led	CPU 1 DIMM 2 Failed
p1.d3.led	CPU 1 DIMM 3 Failed
ft0.fm0.led	Fan Tray 0 Module 0 Failed
ft0.fm1.led	Fan Tray 0 Module 1 Failed

TABLE D-2 LED Sensor IDs

LED Sensor ID	Description
ft0.fm2.led	Fan Tray 0 Module 2 Failed
ft1.fm0.led	Fan Tray 1 Module 0 Failed
ft1.fm1.led	Fan Tray 1 Module 1 Failed
ft1.fm2.led	Fan Tray 1 Module 2 Failed

LED Modes

You supply the modes in [TABLE D-3](#) to the `led set` commands to specify in which mode you want the LED to be placed.

TABLE D-3 LED Modes

Mode	Description
OFF	LED off
ON	LED steady-on
STANDBY	100 ms on, 2900 ms off
SLOW	1 Hz blink rate
FAST	4 Hz blink rate

LED Sensor Groups

Because each LED has its own sensor and can be controlled independently, there is some overlap in sensors. In particular there are separate LEDs defined for the power, locate, and alert LEDs on the front and back panels.

It is desirable to have these sensors “linked” so that both the front and back panel LEDs can be controlled at the same time. This is handled through the use of Entity Association Records. These are records in the SDR that contain a list of entities that are considered part of a group.

For each Entity Association Record we also define another Generic Device Locator as a logical entity to indicate to system software that it refers to a group of LEDs rather than a single physical LED. [TABLE D-4](#) describes the LED sensor groups.

TABLE D-4 LED Sensor Groups

Group Name	Sensors in Group
sys.power.led	bp.power.led fp.power.led
sys.locate.led	bp.locate.led fp.locate.led
sys.alert.led	bp.alert.led fp.alert.led

For example, to set both the front and back panel Power/OK leds to a standby blink rate, you could use this command:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sunoem led set  
sys.power.led standby
```

Set LED fp.power.led to STANDBY

Set LED bp.power.led to STANDBY

Then you could turn off the back panel Power/OK LED but leave the front panel Power/OK LED blinking by using this comand:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme sunoem led set  
bp.power.led off
```

Set LED bp.power.led to OFF

Using IPMItool Scripts For Testing

For testing purposes, it is often useful to change the status of all (or at least several) LEDs at once. You can do this by constructing an IPMItool script and executing it with the `exec` command.

For example, a script to turn on all Fan module LEDS would look like:

```
sunoem led set ft0.fm0.led on  
sunoem led set ft0.fm1.led on  
sunoem led set ft0.fm2.led on  
sunoem led set ft1.fm0.led on  
sunoem led set ft1.fm1.led on  
sunoem led set ft1.fm2.led on
```

If this script file were then named, `leds_fan_on.isc`, you would use it in a command as shown here:

```
ipmitool -I lanplus -H <IPADDR> -U root -P changeme exec leds_fan_on.isc
```


Error Handling

This appendix contains information about how the servers process and log errors. See the following sections:

- [“Handling of Uncorrectable Errors” on page 67](#)
- [“Handling of Correctable Errors” on page 70](#)
- [“Handling of Parity Errors \(PERR\)” on page 72](#)
- [“Handling of System Errors \(SERR\)” on page 75](#)
- [“Handling Mismatching Processors” on page 77](#)
- [“Hardware Error Handling Summary” on page 78](#)

Handling of Uncorrectable Errors

This section lists facts and considerations about how the server handles uncorrectable errors.

Note – The BIOS ChipKill feature must be disabled if you are testing for failures of multiple bits within a DRAM (ChipKill corrects for the failure of a four-bit wide DRAM).

- The BIOS logs the error to the SP system event log (SEL), through the board management controller (BMC).
- The SP's SEL is updated with the failing DIMM pair's particular bank address.
- The system reboots.
- The BIOS logs the error in DMI.

Note – If the error is on low 1MB, the BIOS freezes after rebooting. Therefore, no DMI log is recorded.

- An example of the error is reported by the SEL through IPMI 2.0 is as follows:
 - When low memory is erroneous, the BIOS is frozen on pre-boot low memory test because the BIOS cannot decompress itself into faulty DRAM and execute the following items:

```
ipmitool> sel list
100 | 08/26/2005 | 11:36:09 | OEM #0xfb |
200 | 08/26/2005 | 11:36:12 | System Firmware Error | No
usable system memory
300 | 08/26/2005 | 11:36:12 | Memory | Memory Device
Disabled | CPU 0 DIMM 0
```

- When the faulty DIMM is beyond the BIOS's low 1MB extraction space, proper boot happens:

```
ipmitool> sel list
100 | 08/26/2005 | 05:04:04 | OEM #0xfb |
200 | 08/26/2005 | 05:04:09 | Memory | Memory Device
Disabled | CPU 0 DIMM 0
```

- Note the following considerations for this revision:
 - Uncorrectable ECC Memory Error is not reported.
 - Multi-bit ECC errors are reported as Memory Device Disabled.
 - On first reboot, BIOS logs a HyperTransport Error in the DMI log.
 - The BIOS disables the DIMM.
 - The BIOS sends the SEL records to the BMC.
 - The BIOS reboots again.
 - The BIOS skips the faulty DIMM on the next POST memory test.
 - The BIOS reports available memory, excluding the faulty DIMM pair.

FIGURE E-1 shows an example of a DMI log screen from BIOS Setup Page.

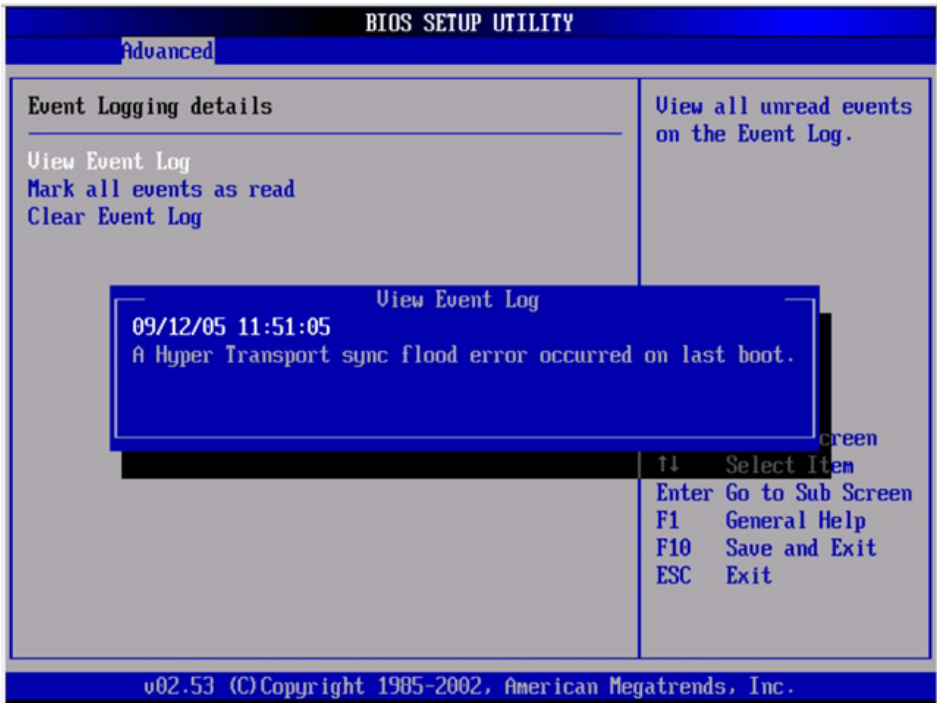


FIGURE E-1 Sample DMI Log Screen, Uncorrectable Error

Handling of Correctable Errors

This section lists facts and considerations about how the server handles correctable errors.

- During BIOS POST:
 - The BIOS polls the MCK registers.
 - The BIOS logs to DMI.
 - The BIOS logs to the SP SEL through the BMC.
- The feature is turned off at OS boot time by default.
- The following Linux versions report correctable ecc syndrome and memory fill errors in `/var/log`, if kernel flag `mce` is indicated at boot time, or if `mce` is enabled through kernel compile or installation:
 - RH3 Update5 single core
 - RH4 Update1+
 - SLES9 SP1+
- The Linux kernel (`x86_64/kernel/mce.c`) repeats a report every 30 seconds until another error is encountered and an 8131 flag is reset.
- Solaris support provides full self-healing and automated diagnosis for the CPU and Memory subsystems.
- [FIGURE E-2](#) shows an example of a DMI log screen from BIOS Setup Page:

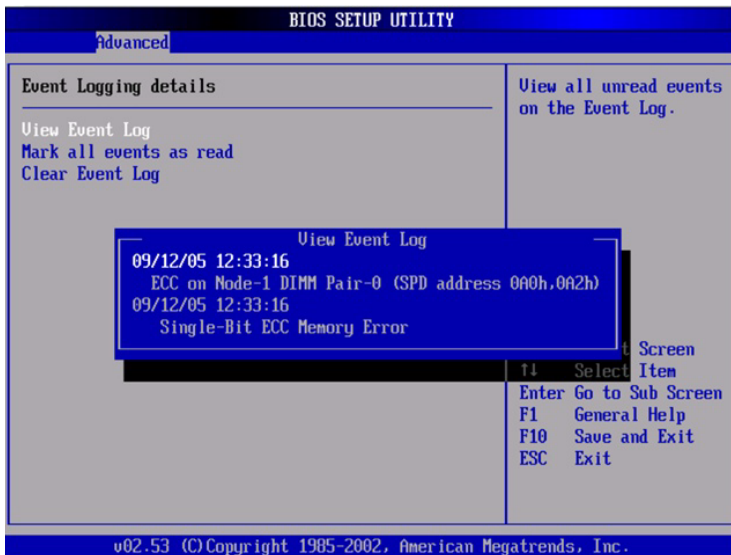


FIGURE E-2 Sample DMI Log Screen, Correctable Error

- If during any stage of memory testing the BIOS finds itself incapable of reading/writing to the DIMM, it takes the following actions:
 - The BIOS disables the DIMM as indicated by the Memory Decreased message in the example in [FIGURE E-3](#).
 - The BIOS logs an SEL record.
 - The BIOS logs an event in DMI.

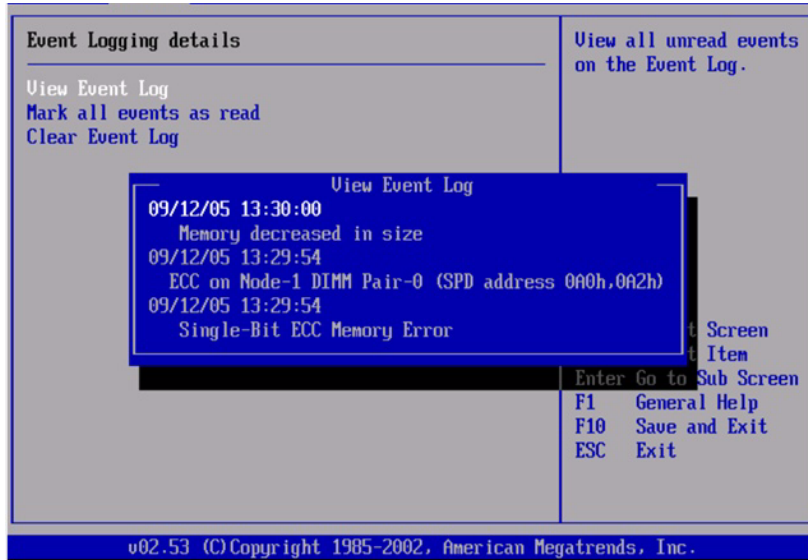


FIGURE E-3 Sample DMI Log Screen, Correctable Error, Memory Decreased

Handling of Parity Errors (PERR)

This section lists facts and considerations about how the server handles parity errors (PERR).

- The handling of parity errors works through NMIs.
- During BIOS POST the NMI is logged in the DMI and the SP SEL. See the following example command and output:

```
[root@d-mpk12-53-238 root]# ipmitool -H 129.146.53.95 -U root  
-P changeme -I lan sel list -v
```

```
SEL Record ID      : 0100  
Record Type        : 00  
Timestamp          : 01/10/2002 20:16:16  
Generator ID       : 0001  
EvM Revision       : 04  
Sensor Type        : Critical Interrupt  
Sensor Number      : 00  
Event Type         : Sensor-specific Discrete  
Event Direction    : Assertion Event  
Event Data         : 04ff00  
Description        : PCI PERR
```

- [FIGURE E-4](#) shows an example of a DMI log screen from BIOS Setup Page, with a parity error.

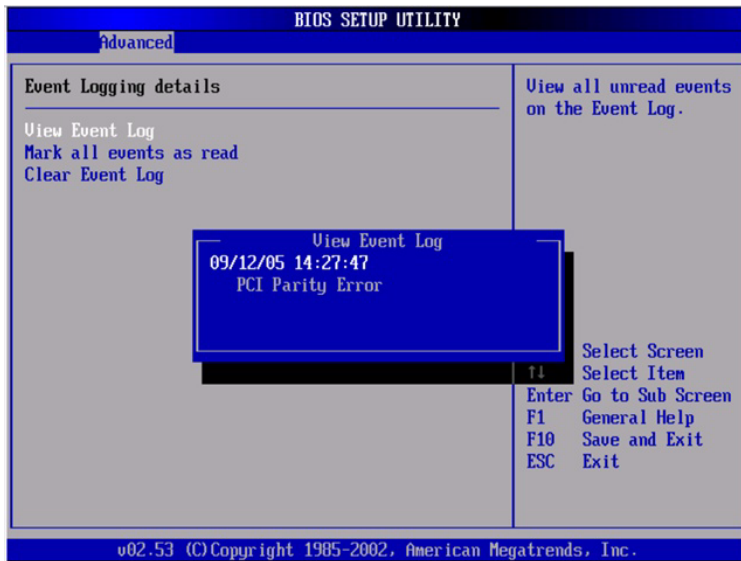


FIGURE E-4 Sample DMI Log Screen, PCI Parity Error

- The BIOS displays the following messages and freezes (during POST or DOS):
 - NMI EVENT!!
 - System Halted due to Fatal NMI!
- The Linux NMI trap catches the interrupt and reports the following NMI "confusion report " sequence:


```
Aug 5 05:15:00 d-mpk12-53-159 kernel: Uhuh. NMI received
for unknown reason 2d on CPU 0.

Aug 5 05:15:00 d-mpk12-53-159 kernel: Uhuh. NMI received
for unknown reason 2d on CPU 1.

Aug 5 05:15:00 d-mpk12-53-159 kernel: Dazed and confused,
but trying to continue

Aug 5 05:15:00 d-mpk12-53-159 kernel: Do you have a strange
power saving mode enabled?

Aug 5 05:15:00 d-mpk12-53-159 kernel: Uhuh. NMI received
for unknown reason 3d on CPU 1.

Aug 5 05:15:00 d-mpk12-53-159 kernel: Dazed and confused,
but trying to continue

Aug 5 05:15:00 d-mpk12-53-159 kernel: Do you have a strange
power saving mode enabled?

Aug 5 05:15:00 d-mpk12-53-159 kernel: Uhuh. NMI received
for unknown reason 3d on CPU 0.
```

Aug 5 05:15:00 d-mpk12-53-159 kernel: Dazed and confused,
but trying to continue

Aug 5 05:15:00 d-mpk12-53-159 kernel: Do you have a strange
power saving mode enabled?

Aug 5 05:15:00 d-mpk12-53-159 kernel: Dazed and confused,
but trying to continue

Aug 5 05:15:00 d-mpk12-53-159 kernel: Do you have a strange
power saving mode enabled?

Note – The Linux system reboots, but does not inform the BIOS of this incident.

Handling of System Errors (SERR)

This section lists facts and considerations about how the server handles system errors (SERR).

- System error handling works through the HyperTransport Synch Flood Error mechanism on 8111 and 8131.
- The following events happen during BIOS POST:
 - POST reports of any previous system errors at the bottom of screen. See [FIGURE E-5](#) for an example.

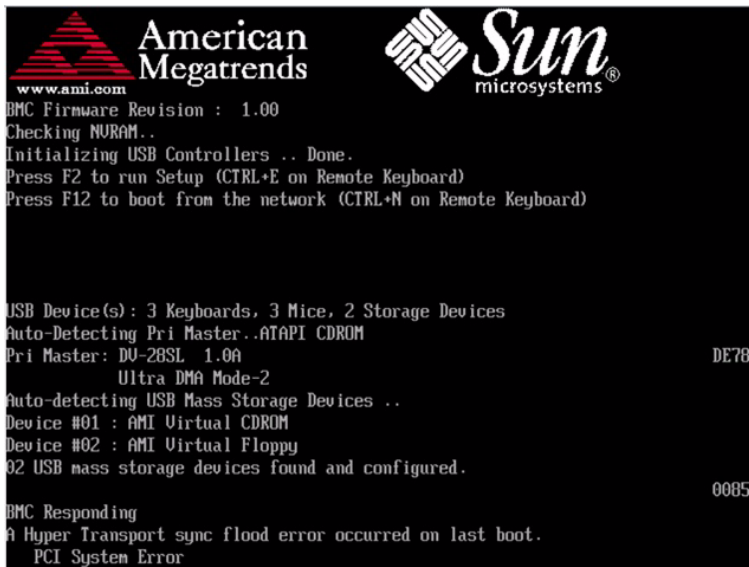


FIGURE E-5 Sample POST Screen, Previous System Error Listed

- SERR and HyperTransport Synch Flood Error are logged in DMI and the SPSEL. See the following sample output:
- ```
SEL Record ID : 0a00
Record Type : 00
Timestamp : 08/10/2005 06:05:32
Generator ID : 0001
EvM Revision : 04
Sensor Type : Critical Interrupt
Sensor Number : 00
Event Type : Sensor-specific Discrete
```

Event Direction : Assertion Event  
Event Data : 05ffff  
Description : PCI SERR

- FIGURE E-6 shows an example DMI log screen from the BIOS Setup Page with a system error.

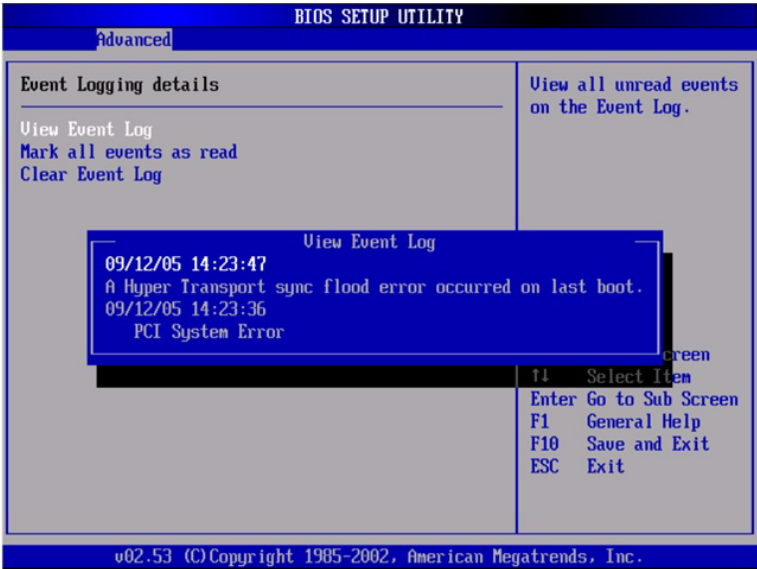


FIGURE E-6 Sample DMI Log Screen, System Error Listed

---

# Handling Mismatching Processors

This section lists facts and considerations about how the server handles mismatching processors.

- The BIOS performs a complete POST.
- The BIOS displays a report of any mismatching CPUs, as shown in the following example.

```
AMIBIOS(C)2003 American Megatrends, Inc.
BIOS Date: 08/10/05 14:51:11 Ver: 08.00.10
CPU : AMD Opteron(tm) Processor 254, Speed : 2.4 GHz
Count : 3, CPU Revision, CPU0 : E4, CPU1 : E6
Microcode Revision, CPU0 : 0, CPU1 : 0
DRAM Clocking CPU0 = 400 MHz, CPU1 Core0/1 = 400 MHz

Sun Fire X4100 Server, 1 AMD North Bridge, Rev E4
1 AMD North Bridge, Rev E6
1 AMD 8111 I/O Hub, Rev C2
2 AMD 8131 PCI-X Controllers, Rev B2
System Serial Number : 0505AMF028
BMC Firmware Revision : 1.00
Checking NVRAM..
Initializing USB Controllers .. Done.
Press F2 to run Setup (CTRL+E on Remote Keyboard)
Press F12 to boot from the network (CTRL+N on Remote
Keyboard)
Press F8 for BBS POPUP (CTRL+P on Remote Keyboard)
```

- No SEL or DMI event is recorded.
- The system enters Halt mode and the following message is displayed.

```
***** Warning: Bad Mix of Processors *****
Multiple core processors cannot be installed with single core
processors.
Fatal Error... System Halted.
```

# Hardware Error Handling Summary

This section contains a table that summarizes the most-common hardware errors that you might encounter with these servers.

**TABLE E-1** Hardware Error Handling Summary

| Error             | Description                                            | Handling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Logged (DMI Log or SP SEL) | Fatal? |
|-------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------|
| SP failure        | The SP fails to boot upon application of system power. | <p>The SP controls the system reset so the system may power on but will not come out of reset.</p> <ul style="list-style-type: none"><li>• During power up, the SP's boot loader turns on the power LED.</li><li>• During SP boot, Linux startup, and SP sanity check The power LED blinks.</li><li>• The LED is turned off when SP management code (the IPMI stack) is started.</li><li>• At exit of BIOS POST the LED goes to STEADY ON state.</li></ul>                                                                                                                                                                                                                                                              | Not logged                 | Fatal  |
| SP failure        | SP boots but fails POST.                               | The SP controls the system RESET so the system will not come out of reset.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Not logged                 | Fatal  |
| BIOS POST failure | Server BIOS does not pass POST.                        | <p>There are fatal and non-fatal errors in POST. The BIOS does detect some errors that are announced during POST as POST codes on the bottom right corner of the display on the serial console and on the video display. Some POST codes are forwarded to the SP for logging.</p> <p>The POST codes described above do not come out in sequential order and some are repeated, because some POST codes are issued by code in add-in card BIOS expansion ROMs.</p> <p>In the case of early POST failures (for example, the BSP fails to operate correctly) BIOS just halts without logging.</p> <p>For some other POST failures subsequent to memory and SP initialization, the BIOS logs a message to the SP's SEL.</p> |                            |        |



**TABLE E-1** Hardware Error Handling Summary

| Error                          | Description                                                                                                                           | Handling                                                                                                                                                                                                                                                                                                                                                                                                            | Logged (DMI Log or SP SEL) | Fatal?           |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------|
| Single-bit DRAM ECC error      | With ECC enabled in the BIOS Setup, the CPU detects and corrects a single-bit error on the DIMM interface.                            | <p>The CPU corrects the error in hardware. No interrupt or machine check is generated by the hardware. The polling is triggered every half-second by SMI timer interrupts, and is done by the BIOS SMI handler.</p> <p>The BIOS SMI handler starts logging each detected error, and stops logging when the limit for the same error is reached. The BIOS's polling is disableable through a software interface.</p> | SP SEL                     | Normal operation |
| Single four-bit DRAM error     | With CKIP-KILL enabled in the BIOS Setup, the CPU detects and corrects for the failure of a four-bit-wide DRAM on the DIMM interface. | <p>The CPU corrects the error in hardware. No interrupt or machine check is generated by the hardware. The polling is triggered every half-second by SMI timer interrupts, and is done by the BIOS SMI handler.</p> <p>The BIOS SMI handler starts logging each detected error, and stops logging when the limit for the same error is reached. The BIOS's polling is disableable via a software interface.</p>     | SP SEL                     | Normal operation |
| Uncorrectable DRAM ECC error   | The CPU detects an uncorrectable multiple-bit DIMM error.                                                                             | <p>The "sync flood" method of handling this is used to prevent the erroneous data from being propagated across the HyperTransport links. The system reboots, the BIOS recovers the machine check register information, maps this information to the failing DIMM (when CHIPKILL is disabled) or DIMM pair (when CHIPKILL is enabled), and logs that information to the SP.</p> <p>The BIOS will halt the CPU.</p>   | SP SEL                     | Fatal            |
| Unsupported DIMM configuration | Unsupported DIMMs are used, or supported DIMMs are loaded improperly.                                                                 | The BIOS displays an error message, logs an error, and halts the system.                                                                                                                                                                                                                                                                                                                                            | DMI Log<br>SP SEL          | Fatal            |
| HyperTransport link failure    | CRC or link error on one of the HyperTransport Links                                                                                  | <p>Sync floods on HyperTransport links, the machine resets itself, and error information gets retained through reset.</p> <p>The BIOS reports, A Hyper Transport sync flood error occurred on last boot, press F1 to continue.</p>                                                                                                                                                                                  | DMI Log<br>SP SEL          | Fatal            |

**TABLE E-1** Hardware Error Handling Summary

| Error                         | Description                                                                                                                                                                                                      | Handling                                                                                                                                                                                                                                                                                                                                                                           | Logged (DMI Log or SP SEL) | Fatal?           |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------|
| PCI SERR, PERR                | System or parity error on a PCI bus                                                                                                                                                                              | Sync floods on HyperTransport links, the machine resets itself, and error information gets retained through reset.<br>The BIOS reports, A Hyper Transport sync flood error occurred on last boot, press F1 to continue.                                                                                                                                                            | DMI Log<br>SP SEL          | Fatal            |
| BIOS POST Microcode Error     | The BIOS could not find or load the CPU Microcode Update to the CPU. The message most likely appears when a new CPU is installed in a motherboard with an outdated BIOS. In this case, the BIOS must be updated. | The BIOS displays an error message, logs the error to DMI, and boots.                                                                                                                                                                                                                                                                                                              | DMI Log                    | Non-fatal        |
| BIOS POST CMOS Checksum Bad   | CMOS contents failed the Checksum check.                                                                                                                                                                         | The BIOS displays an error message, logs the error to DMI, and boots.                                                                                                                                                                                                                                                                                                              | DMI Log                    | Non-fatal        |
| Unsupported CPU configuration | The BIOS supports mismatched frequency and steppings in CPU configuration, but some CPUs might not be supported.                                                                                                 | The BIOS displays an error message, logs the error, and halts the system.                                                                                                                                                                                                                                                                                                          | DMI Log                    | Fatal            |
| Correctable error             | The CPU detects a variety of correctable errors in the MCI_STATUS registers.                                                                                                                                     | The CPU corrects the error in hardware. No interrupt or machine check is generated by the hardware. The polling is triggered every half-second by SMI timer interrupts, and is done by the BIOS SMI handler.<br>The SMI handler logs a message to the SP SEL if the SEL is available, otherwise SMI logs a message to DMI. The BIOS's polling is disableable through software SMI. | DMI Log<br>SP SEL          | Normal operation |
| Single fan failure            | Fan failure is detected by reading tach signals.                                                                                                                                                                 | The Front Fan Fault, Service Action Required, and individual fan module LEDs are lit.                                                                                                                                                                                                                                                                                              | SP SEL                     | Non-fatal        |

**TABLE E-1** Hardware Error Handling Summary

| Error                         | Description                                                                                   | Handling                                                                                                                                                                          | Logged (DMI Log or SP SEL) | Fatal?    |
|-------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------|
| Multiple fan failure          | Fan failure is detected by reading tach signals.                                              | The Front Fan Fault, Service Action Required, and individual fan module LEDs are lit.                                                                                             | SP SEL                     | Fatal     |
| Single power supply failure   | When any of the AC/DC PS_VIN_GOOD or PS_PWR_OK signals are deasserted.                        | Service Action Required, and Power Supply/Rear Fan Tray Fault LEDs are lit.                                                                                                       | SP SEL                     | Non-fatal |
| DC/DC power converter failure | Any POWER_GOOD signal is deasserted from the DC/DC converters.                                | The Service Action Required LED is lit, the system is powered down to standby power mode, and the Power LED enters standby blink state.                                           | SP SEL                     | Fatal     |
| Voltage above/below Threshold | The SP monitors system voltages and detects voltage above or below a given threshold.         | The Service Action Required LED and Power Supply/Rear Fan Tray Fault LED blink.                                                                                                   | SP SEL                     | Fatal     |
| High temperature              | the SP monitors CPU and system temperatures, and detects temperature above a given threshold. | The Service Action Required LED and System Overheat Fault LED blink. The motherboard is shut down above the specified critical level.                                             | SP SEL                     | Fatal     |
| Processor thermal trip        | The CPU drives the THERMTRIP_L signal upon detecting an overtemp condition.                   | CPLD shuts down power to the CPU. The Service Action Required LED and System Overheat Fault LED blink.                                                                            | SP SEL                     | Fatal     |
| Boot device Failure           | The BIOS is not able to boot from a device in the boot device list.                           | The BIOS goes to the next boot device in the list. If all devices in the list fail, an error message is displayed, retry from beginning of list. SP can control/change boot order | DMI Log                    | Non-fatal |



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